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R. F. HARROD AND E. A. G. ROBINSON

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THE ECONOMIC JOURNAL

DECEMBER 1950

THE SUBSTITUTION EFFECT IN VALUE THEORY

I

THE Slutsky–Hicks theory of value is based on a fundamental equation which divides the effect of any price change on demand into two parts—that due to change in real income (the income effect) and that due to change in relative prices with real income constant (the substitution effect). The theory is expressed mathematically in terms of derivatives, *i.e.*, rates or directions of change.[1] Most economists, however, cannot operate at all easily in these terms. In expounding and applying the theory, they throw it into diagrammatic form, in two (or perhaps in three) dimensions, and allow the hypothetical consumer to jump from one situation to another, as represented by two distinct points on the diagram. Hicks himself does this in the text of *Value and Capital*, confining the mathematical exposition to an Appendix. As Mosak has pointed out, Hicks gets into difficulties in two ways.[2] There is first a difference according as the income effect is taken first and then the substitution effect, or conversely (cf. Mosak's Figs. 1 and 2), and secondly, a difference according to the specific interpretation given to the substitution effect (cf. Mosak's Figs. 2 and 3). These difficulties arise solely because of the attempt to translate the fundamental equation into diagrammatic terms with finite changes in prices and income.

While Hicks was developing his theory, Samuelson was making progress on another tack.[3] He is quite prepared, indeed anxious, to found the theory of value on finite changes by modifying and extending the Slutsky–Hicks fundamental equation. He also wishes to divorce the theory from any initial assumption of a scale of preferences or an (ordinal) utility function. Consequently, his diagrammatic representation includes no familiar indifference contours and his development is not easily appreciated by those accustomed to think in terms of indifference maps.

[1] Hicks, *Value and Capital*, 2nd edition, Mathematical Appendix, pp. 305–14.

[2] Mosak, "On the Interpretation of the Fundamental Equation of Value Theory," in *Studies in Mathematical Economics and Econometrics* (ed. Lange, McIntyre and Yntema).

[3] Samuelson, "The Problem of Integrability in Utility Theory," *Economica*, November 1950, and the earlier references there quoted.

If the theory of value is not to fall again into a state of confusion, it is time we resolved these difficulties and differences.[1] The following development is an attempt at consolidation. It starts by recognising the facts that economists think in terms of finite changes in prices, income and other variables and that they prefer to have diagrammatic representations in two dimensions, bringing in later the complications of more than two dimensions. It leaves it open at first whether to assume, for purposes of exposition, the existence of an indifference map, and it brings out later the relevance of the map.

II

The basic construction in two dimensions is shown in Fig. 1. There are two commodities X and Y, of which Y can be taken as

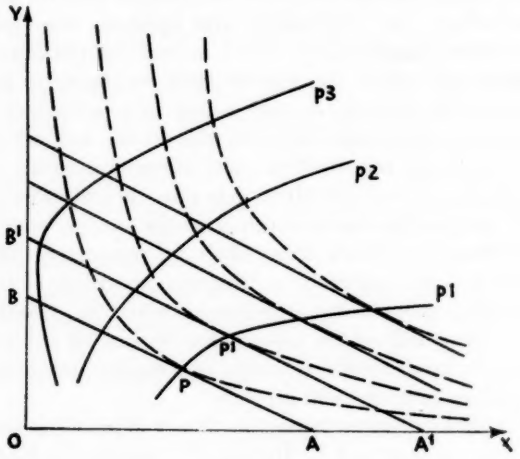

FIG. 1.

numeraire. The price of X in terms of Y is denoted by p and income (again in terms of Y) by M. For an individual consumer, the income effect is easily represented. Fix p and let M increase; then the demands for X and Y will vary along some curve in the (XY) plane. There is one such curve, called by Hicks the "income-consumption curve," for each price p fixed, and Fig. 1 shows three curves corresponding to prices p_1, p_2, p_3 $(p_1 < p_2 < p_3)$. The curves will generally proceed in the N.E. direction, X and Y

[1] They appear also in the theory of production, cf. Makower and Baumol, "The Analogy between Producer and Consumer Equilibrium Analysis," *Economica*, February 1950.

both increasing with M, as shown for the curves p_1 and p_2 in Fig. 1. It is possible, however, that some of the curves may take the form shown by p_3 in Fig. 1, in which case X is an inferior commodity, and X will decrease while Y increases with M, at low income levels. In Samuelson's terms, a higher point (corresponding to a higher income) on an income–consumption curve is revealed to be preferable to a lower point on the same curve. The consumer is " better off " with the higher income; he could, if he desired, continue to buy the combination of commodities bought at the lower income. There is nothing more which can be said about the income effect. The income–consumption curves are (ideally) observable phenomena, and simply express the demand reactions of the consumer to changing income, price fixed.[1]

The diagrammatic interpretation of p and M is by means of a " price line " AB (Fig. 1). Given p and M, the consumer can acquire only those combinations of X and Y shown by points on AB, where OB is M and OA is $\frac{M}{p}$. The (negative) slope of the line AB is p. If p is fixed (say p_1) and M increases, then the line AB of slope p_1 moves parallel to itself in the N.E. direction. Each point P, P^1, . . . on the p_1 income–consumption curve lies on one of these parallel lines. What can be said about these points? Following Samuelson, we can say simply that P is revealed to be preferable to all other combinations on AB (which can be bought with the same income at the given price). If we assume an (ordinal) preference scale for the consumer, then we can insert a set of indifference curves, shown as broken curves in Fig. 1. The point P can then be interpreted as the point where the given line AB touches an indifference curve, *i.e.*, the income–consumption curve is the locus of points where the price line, moving parallel to itself, touches indifference curves. This does not add anything, except perhaps for purposes of exposition.

It should be noted that there is no difficulty in handling finite changes in income. As income increases from M $(= OB)$, the direction of change of demand is along the income–consumption curve from P. If income increases from M $(= OB)$ to M^1 $(= OB^1)$, then demand changes from that at P to that at P^1. It is immaterial whether we hop direct from P to P^1 or move " con-

[1] What is required of consumer's demand is that the demand for each commodity is a single-valued, continuous function of prices and income, which can be inverted to give prices and income each as a single-valued, continuous function of the demands. This ensures a set of non-intersecting income–consumption curves of the form illustrated.

tinuously " along the curve between these points. Further, there are no difficulties about extending into three (or more) dimensions. There are now three commodities, and the parameters are two (relative) prices and income. The income–consumption curves become curves in three dimensions, while the price lines are replaced by price planes. Each of the points P, P^1, . . . on an income–consumption curve is revealed to be preferable to all other points on the appropriate price plane. If we assume an (ordinal) preference scale and integrability, then P, P^1, . . . are points where a parallel set of price planes touch the indifference surfaces. But, again, there is nothing much to be gained from the extra assumption at this stage.

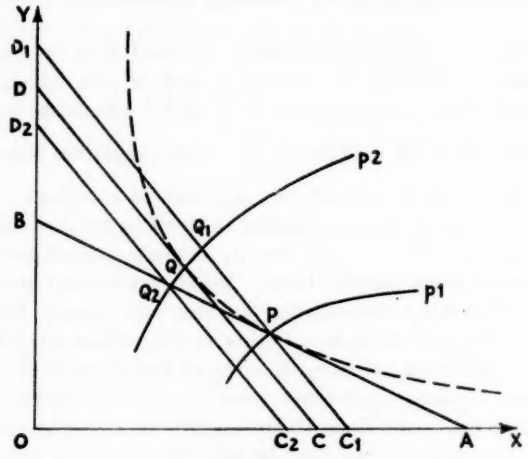

FIG. 2.

The difficulties arise at the next stage, in the attempt to define and interpret the substitution effect. Here relative prices change and real income is held constant. But what is meant by constant real income? The two-dimensional construction is shown in Fig. 2. In the initial position the price of X (in terms of Y) is p_1 and the consumer's income is $M = OB$; the demands of the consumer are represented by the point P, on the income–consumption curve p_1 and on the price line AB with (negative) slope p_1. The price now changes to p_2. The consumer shifts to some position on the income–consumption curve p_2; which position depends entirely on his income in the new situation. The whole problem of defining the substitution effect is to fix a move which maintains the consumer's real income. If the price

change is an increase in price (as illustrated in Fig. 2), then income in terms of *numeraire* Y must increase to maintain real income. The new price line with (negative) slope p_2 must cut the vertical axis above B, as do CD, C_1D_1 and C_2D_2 in Fig. 2. How much must income increase from $M = OB$? In Slutsky's terminology, what compensating income change from OB is needed to offset the price change?

We are not starting with any assumption of a preference scale, and we cannot answer this question right away. We can, however, place limits on the compensating income change. One move is from P to Q_1 on the price line C_1D_1 with (negative) slope p_2 which passes through P. The consumer's income is then increased from OB to OD_1. With this income and with the new price p_2, the consumer could continue to buy the quantities represented by the point P; in fact, he prefers to buy the quantities represented by the point Q_1. In Samuelson's terms, Q_1 is revealed to be preferable to P and the consumer is " better off " as a result of the shift. The increase in income from OB to OD_1 overestimates the compensating income change.

Another move is from P to Q_2 on the original price line AB. The new price line through Q_2 is C_2D_2 and the consumer's income is increased from OB to OD_2. With this income and the new price p_2, the consumer would buy the quantities represented by Q_2. He could have bought these same quantities with the original income at the original price; in fact, he then preferred to buy the quantities represented by P. Following Samuelson, we say that P is revealed to be preferable to Q_2 and the consumer was " better off " before the shift. The increase in income from OB to OD_2 under-estimates the compensating income change.

We have now: Q_1 is revealed preferable to P, and P is revealed preferable to Q_2. What we wish to say is that Q_1 is revealed preferable to Q_2, and that under no circumstances can Q_2 be revealed preferable to Q_1. This is in fact the basic assumption of value theory to which Houthakker and Samuelson are led.[1] If this basic assumption is made, then we can be certain that Q_1 is higher than Q_2 on the income–consumption curve, that income OD_1 is greater than income OD_2, and that we have genuine limits to the compensating income change.

In addition, as Houthakker and Samuelson show, the basic assumption implies integrability, *i.e.*, the existence of an (ordinal)

[1] Houthakker, " Revealed Preference and the Utility Function," *Economica*, May 1950; Samuelson, " The Problem of Integrability in Utility Theory," *Economica*, November 1950.

preference scale which can be represented by a system of indifference curves (in the two-dimensional case here illustrated) or indifference surfaces (in more than two dimensions). Hence, we can now assume an indifference map however many dimensions (commodities) we take. In Fig. 2 the indifference curve through P cuts the income–consumption curve p_2 at Q; the price line CD is tangential to the indifference curve at Q. The move from P to Q corresponds to constant real income in the sense that the consumer is equally well off at P and at Q. The compensating income change is thus from OB to OD; the substitution effect on demand is shown by the shift from P to Q.

It is one thing to assert the existence of the indifference curve and the point Q; it is another to say that we can use them in practice to measure and apply the substitution effect. Following Samuelson, we can go so far as to say that, by judiciously varying price and income, we can get from observable data an approximation to the indifference curve, either just superior to it, or just inferior to it. That is, we are approximating to Q by means of points like Q_1 and Q_2; if we can choose our own steps in varying price and income, we can make them small and numerous enough always to keep Q_1 and Q_2 close to Q. Whatever we do, however, we must rely on limits to Q. If we only have the two prices p_1 and p_2, then the particular limits Q_1 and Q_2 are all we have for Q.

Making the Houthakker–Samuelson assumption, we reach the following conclusion on the substitution effect.[1] The price increases from p_1 to p_2 and the consumer shifts from the initial position P to some position on the p_2 income–consumption curve. The particular shift which leaves real income unchanged is from P to Q along an indifference curve, the price increase being compensated by an increase in income from OB to OD. The substitution effect on demand is shown by the changing co-ordinates of P and Q. In practice, given only the two price situations, Q cannot be identified except as lying between limits Q_1 and Q_2; the compensating income increase is only fixed as lying between BD_1 and BD_2.

Since the Houthakker–Samuelson assumption implies integrability, the conclusion extends at once to three (or more) commodities. From an initial point P in commodity space, the consumer shifts to some point on a new income–consumption

[1] Historically, each of the three shifts from P to Q, Q_1 and Q_2 has been described as a compensated price change. Hicks in the text of *Value and Capital* uses P to Q; Slutsky had in mind the shift from P to Q_1, and Samuelson's first exposition took P to Q_2.

curve as the relative prices change. The indifference surface and the two price planes through P cut this curve in three points (Q, Q_1 and Q_2). The substitution effect again corresponds to a shift from P to a point on a curve between two identifiable points Q_1 and Q_2. The only difference is that the curve is in three (or more) dimensions instead of two.

The fact must be recognised that a compensated price change (*i.e.*, the substitution effect) can be identified only within limits. But it turns out to be a fact of little significance as regards observable properties of consumer's demand. There is only one general and observable feature of the substitution effect on demand, and it is independent of whether the substitution effect is taken as a shift from P to Q_1, from P to Q_2 or from P to any position between Q_1 and Q_2. It remains to see what this property is.

In the case of a single commodity X and *numeraire* Y, illustrated by Fig. 2, the general property is that all positions from Q_1 to Q_2 lie to the N.W. of P when there is an increase in the price of X relative to Y. The demand for X falls when the price of the commodity rises and when there is a compensating increase in income of amount anywhere between the two limits. Conversely, the demand for X rises when there is a compensated fall in the price of X. This property can be written :

$$\Delta p \Delta x < 0$$

where Δx is the change in demand for X consequent upon a compensated price change Δp. As is shown algebraically below, the property can be generalised to the case of any number (n) of commodities and appears :

$$\Sigma \Delta p_r \Delta x_r < 0$$

where Δx_r is the change in demand following a compensated price change Δp_r ($r = 1, 2, \ldots n$). The compensating income change can be that corresponding to Q_1, to Q_2 or to any position between these two.

This property expresses all we can know in general about the substitution effect on demand. Very broadly, it implies that on balance demands will fall when prices rise with a compensating rise in income. More strictly, if at least one price rises and no prices fall, then the demand for at least one commodity (among those which have risen in price) must fall. The price rise must be compensated by an income rise, but this compensation can be anywhere between the two identifiable limits. As a particular case, if the price of only one commodity changes (with a com-

pensating income change), then the demand for the commodity changes in the opposite sense to the price.

Two final points can be made. First, the shifts from P to Q_1 and Q_2 differ for any finite price change. But, if we are considering only the *direction* of change for the point P, then the compensated price change is unique; Q, Q_1 and Q_2 all coincide in the limit as Q approaches P. So the fundamental equation in derivative form, as given by Slutsky–Hicks, is unambiguous as an indication of direction of change. It is only when a finite jump is made from P that we have to be clear as to how the jump is made. Second, the problem of the compensating income change is exactly that encountered in index-number theory. By definition, the price index is the ratio of the "compensating" income to the initial income, and the "compensating" income is that which leaves the consumer equally well off in the new price situation. In terms of index numbers, our conclusion is that a price index can be defined; however, given only two price situations, it cannot be measured but only approximated by one limit or another. This is familiar ground. The jump from P to Q_1 corresponds to the Laspeyres form of the index—the consumer getting better off by an income compensation which would permit him to continue to buy the initial quantities. The jump from P to Q_2 corresponds to the Paasche form of the index—the consumer getting worse off since the income compensation confines him to quantities which he could have bought initially.

III

The general analytical development for n commodities X_1, $X_2 \ldots X_n$ is as follows. In the initial situation the prices are $p_r (r = 1, 2, \ldots n)$ and the consumer's income is M. The consumer's demands are $x_r (r = 1, 2, \ldots n)$.

So
$$M = \Sigma p_r x_r \quad . \quad . \quad . \quad . \quad . \quad . \quad . \quad (1)$$

where Σ extends over $r = 1$ to $r = n$.

In a second situation, let the prices be $(p_r + \Delta p_r)$, the demands $(x_r + \Delta x_r)$ and the consumer's income

$$M + \Delta M = \Sigma(p_r + \Delta p_r)(x_r + \Delta x_r) \quad . \quad . \quad . \quad . \quad (2)$$

So, from (1),

$$\Delta M = \Sigma p_r \Delta x_r + \Sigma \Delta p_r x_r + \Sigma \Delta p_r \Delta x_r \quad . \quad . \quad (3)$$

Assume, first, Samuelson's "weak axiom" (*Economica*, November 1950) implying consistency of preference as between

two situations only. Then there are two approximations to compensated price changes :

Case A. This is the Laspeyres Case, corresponding to Q_1, of Fig. 2. The income of the second situation is such that the initial quantities can still be bought at the second prices :

$$M + \Delta M = \Sigma(p_r + \Delta p_r)x_r$$

i.e., from (2)

$$\Sigma(p_r + \Delta p_r)\Delta x_r = 0 \quad . \quad . \quad . \quad . \quad . \quad \text{(A1)}$$

The second situation is preferred to the initial, *i.e.*, the second quantities cost more than the initial quantities at the initial prices :

$$\Sigma p_r(x_r + \Delta x_r) > \Sigma p_r x_r$$

i.e.,

$$\Sigma p_r \Delta x_r > 0 \quad . \quad . \quad . \quad . \quad . \quad \text{(A2)}$$

So from (A1) and (A2)

$$\Sigma \Delta p_r \Delta x_r < 0 \quad . \quad . \quad . \quad . \quad . \quad \text{(A3)}$$

and from (A1) and (3)

$$\Delta M = \Sigma \Delta p_r x_r \quad . \quad . \quad . \quad \text{(A4)}$$

Case B. This is the Paasche Case, corresponding to Q_2 of Fig. 2. The income of the second situation is such that the quantities demanded at this income can be bought at the initial prices and income

$$M = \Sigma p_r(x_r + \Delta x_r)$$

i.e., from (1)

$$\Sigma p_r \Delta x_r = 0 \quad . \quad . \quad . \quad . \quad . \quad \text{(B1)}$$

The initial situation is preferred to the second, *i.e.*, the initial quantities cost more than the second quantities at the second prices :

$$\Sigma(p_r + \Delta p_r)x_r > \Sigma(p_r + \Delta p_r)(x_r + \Delta x_r)$$

i.e.,

$$\Sigma(p_r + \Delta p_r)\Delta x_r < 0 \quad . \quad . \quad . \quad . \quad \text{(B2)}$$

So from (B1) and (B2)

$$\Sigma \Delta p_r \Delta x_r < 0 \quad . \quad . \quad . \quad . \quad \text{(B3)}$$

and from (B1) and (3)

$$M = \Sigma \Delta p_r(x_r + \Delta x_r) \quad . \quad . \quad . \quad \text{(B4)}$$

Now, assume Samuelson's "strong axiom" (*Economica*, November 1950) implying consistency of preference for a series of situations and hence integrability. This permits us to take Cases A and B together, (A4) giving an upper limit *and* (B4) a lower limit to the compensating income change. Further, the true compensated price change can be defined :

Case C. This corresponds to Q of Fig. 2.

The income of the second situation is such that the quantities demanded are on the same indifference level $u(x_1, x_2, \ldots x_r) =$ constant as the initial quantities. The initial situation is preferred at the initial prices, and so the second quantities cost more than the first quantities at these prices :

$$\Sigma p_r(x_r + \Delta x_r) > \Sigma x_r p_r$$

i.e.,
$$\Sigma p_r \Delta x_r > 0 \quad . \quad . \quad . \quad . \quad . \quad . \quad \text{(C1)}$$

Similarly the second situation is preferred at the second prices :

$$\Sigma(p_r + \Delta p_r)(x_r + \Delta x_r) < \Sigma(p_r + \Delta p_r)x_r$$

i.e.,
$$\Sigma(p_r + \Delta p_r)\Delta x_r < 0 \quad . \quad . \quad . \quad . \quad . \quad . \quad \text{(C2)}$$

So from (C1) and (C2)

$$\Sigma \Delta p_r \Delta x_r < 0 \quad . \quad . \quad . \quad . \quad . \quad . \quad \text{(C3)}$$

and from (C1), (C2) and (3)

$$\Sigma \Delta p_r(x_r + \Delta x_r)_r < \Delta M < \Sigma \Delta p_r x_r \quad . \quad \text{(C4)}$$

Collecting the results (A1) to (C4) together, we find three cases where the change in prices is compensated by a change ΔM in income in such a way as to give the fundamental inequality :

$$\Sigma \Delta p_r \Delta x_r < 0.$$

The three compensating changes are :

	Case A (Laspeyres).	Case B (Paasche).	Case C (Indifference).
$\Sigma p_r \Delta x_r$ . . .	> 0	$= 0$	> 0
$\Sigma(p_r + \Delta p_r)\Delta x_r$.	$= 0$	< 0	< 0
ΔM . . .	$\Sigma \Delta p_r x_r$	$\Sigma \Delta p_r(x_r + \Delta x_r)$	Between $\Sigma \Delta p_r(x_r + \Delta x_r)$ and $\Sigma \Delta p_r x_r$

In the above table, Δx_r refers to a particular shift and differs from one column to another. The shift is from P to Q_1 for Case A, to Q_2 for Case B and to Q for Case C. The $\Delta x_r (r = 1, 2, \ldots n)$ are observable in Cases A and B; the $\Delta p_r (r = 1, 2, \ldots n)$ are given by the postulated price change.

The price-index-number problem can be expressed as follows. The compensating income change ΔM is limited by the values of Cases A and B :

$$\Sigma \Delta p_r(x_r + \Delta x_r) < \Delta M < \Sigma \Delta p_r x_r$$

where Δx_r corresponds to the shift from P to Q_2 for which $\Sigma p_r \Delta x_r = 0$.

So
$$\frac{\Sigma(p_r + \Delta p_r)(x_r + \Delta x_r)}{\Sigma p_r(x_r + \Delta x_r)} < \frac{M + \Delta M}{M} < \frac{\Sigma(p_r + \Delta p_r)x_r}{\Sigma p_r x_r}$$

since
$$M = \Sigma p_r x_r = \Sigma p_r(x_r + \Delta x_r).$$

Changing the notation so that p_0, x_0 refer to the first situation (P) and p_1, x_1 to the second (Q_2), we have the limits for the price index I_{01}:

$$\frac{\Sigma p_1 x_1}{\Sigma p_0 x_1} < I_{01} < \frac{\Sigma p_1 x_0}{\Sigma p_0 x_0}.$$

Here x_1 corresponds to the particular demands at the p_1 prices for which

$$\Sigma p_0 x_1 = \Sigma p_0 x_0.$$

The actual demands of the consumer in the second situation have no relevance; they correspond to some change in real income in addition to the substitution effect. This is precisely the position taken by Staehle.[1]

The Slutsky–Hicks theory, in the form developed in the Appendix to *Value and Capital*, appears as the limiting case of the above development, finite changes in prices and income being replaced by differential changes (*i.e.*, directions of change). Any price change $dp_r (r = 1, 2, \ldots n)$ is compensated by the income change

$$dM = \sum_r x_r dp_r$$

and we have (Cases A, B and C all coinciding):

$$\left.\begin{aligned} \sum_r p_r dx_r &= 0 \\ \sum_r dp_r dx_r &< 0 \end{aligned}\right\} \quad \ldots\ldots\ldots \quad (4)$$

Also

$$\begin{aligned} dx_r &= \sum_s \frac{\partial x_r}{\partial p_s} dp_s + \frac{\partial x_r}{\partial M} dM \\ &= \sum_s \left(\frac{\partial x_r}{\partial p_s} + x_s \frac{\partial x_r}{\partial M}\right) dp_s \\ &= \sum_s x_{rs} dp_s \end{aligned}$$

where $x_{rs} = \dfrac{\partial x_r}{\partial p_s} + x_s \dfrac{\partial x_r}{\partial M}$ is Hicks' substitution term.

All the properties of x_{rs} are derivable from the conditions (4), *i.e.*, from

$$\sum_r \sum_s p_r x_{rs} dp_s = 0$$

$$\sum_r \sum_s x_{rs} dp_r dp_s < 0$$

for any price changes whatever.

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[1] Staehle, "A Development of the Economic Theory of Price Index Numbers," *Review of Economic Studies*, June 1935.

THE PREMIUM ON U.S. DOLLAR SECURITIES

COMPARATIVELY few people are aware of the existence before their eyes of a phenomenon which is unusual in these days of government control—a pure equilibrium price, in the disembodied form of the premium on U.S. dollar stocks on the London Stock Exchange.

This dollar premium, as it is usually if elliptically called, has not attracted all the attention it deserves, partly because it has existed in its present context only since October 1947, and partly because the surrounding technicalities have concealed its interesting theoretical implications. This survey therefore sets out to explain the characteristics and working of the dollar premium, its history, the reasons for its existence, why it is uniform and the way its size is determined.

THE NATURE OF THE DOLLAR PREMIUM

Each day there appears in the *Stock Exchange Daily Official List* a single quotation, thus : " U.S. dollar securities : premium on United States quotations, 16%." This premium is the percentage addition to an American price of a security converted into sterling at the official rate of exchange. It applies equally to all American stocks other than those particular holdings placed at the Treasury's disposal in 1941 and pledged against the R.F.C. loan. If a share is quoted in New York at $100 when the premium here is 17% and the official rate of exchange is $2·80, the sterling value of that share in £s in London, and the price (subject only to dealing expenses) at which it changes hands, is £[(100 + 17)% × $100 ÷ $2·80], or £41·8. In practice, the latter price would be written as $209 London, owing to the stock exchange convention of expressing prices of American securities in London dollars having a fixed value of $5 London = £1.

The dollar premium can also be described as the percentage addition to the sterling cost at the official exchange rate of a U.S. dollar, and a special rate can therefore be worked out which consolidates the premium and the official rate. The resulting figure is the British market rate for securities dollars, which are U.S. dollar values held in the form of American securities in U.K. ownership. Given the premium and the official rate, the calculation is :

$$100 \times \frac{\text{official rate of exchange in \$ per £}}{(100 + \text{premium})} = \text{rate of securities dollars per £}$$

London Premium on U.S. Dollar Securities

Weekly, October 1947–September 1950 *

(Official exchange rate: $4.03 = £1 to September 18, 1949, $2.80 thereafter)

Date.	Premium, %.	Securities $, per £.	Date.	Premium, %.	Securities $, per £.
1947 Oct. 1	10	3·66	1948 Sept. 15	29	3·12
2	15+	3·50−	22	29	3·12
3	16–17	3·44–3·48	29	29	3·12
6	18½–20½	3·35–3·40	Oct. 6	30	3·10
7	up to 18	3·42+	13	29	3·12
8	15–17	3·44–3·50	20	30	3·10
9	12–14	3·54–3·60	27	29	3·12
10	12–14	3·54–3·60	Nov. 3	28	3·14
			10	31	3·08
15	12–13	3·55–3·60	17	31	3·08
22	11–12	3·60–3·63	24	30	3·10
29	10–14	3·54–3·66	Dec. 1	32	3·05
Nov. 5	15–17	3·44–3·50	8	31	3·08
12	15–16	3·48–3·50	15	31	3·08
19	14½–16	3·48–3·52	22	32	3·05
26	16–17	3·44–3·48	29	33	3·03
Dec. 3	17–18	3·42–3·44			
10	16	3·48			
17	16	3·48	1949 Jan. 5	32	3·05
24	19	3·38	12	32	3·05
31	17½	3·43	19	32	3·05
			25	31	3·08
1948 Jan. 7	18½	3·40	Feb. 2	30	3·10
14	22	3·30	9	29	3·12
21	25	3·22	16	25	3·22
28	23½	3·26	23	27	3·17
Feb. 4	up to 29	3·12−	Mar. 2	27	3·17
11	22½	3·29	9	26	3·20
18	21½	3·32	16	25	3·22
25	23	3·28	23	24	3·25
Mar. 3	25	3·22	30	24	3·25
10	25	3·22	Apr. 6	25	3·22
17	26½	3·19	13	29	3·12
24	29½	3·11	20	29	3·12
31	26½	3·19	27	32	3·05
			May 4	32	3·05
Apr. 7	28½	3·13	11	33	3·03
14	26½	3·18	18	34	3·01
21	27½	3·16	25	33	3·03
28	29	3·12	June 1	33	3·03
May 5	34	3·01	8	34	3·01
12	33½	3·02	15	34	3·01
19	35	2·99	22	33	3·03
26	34½	2·99	29	33	3·03
June 2	34¼	2·99	July 6	34	3·01
9	34	3·01	13	35	2·99
16	29½	3·11	20	35	2·99
23	29	3·12	27	36	2·96
30	26½	3·19	Aug. 3	35	2·99
July 7	26½	3·19	10	35	2·99
14	26	3·20	17	36	2·96
21	23	3·28	24	36	2·96
28	25½	3·21	31	36	2·96
Aug. 4	24½	3·24	Sept. 7	36	2·96
11	25	3·22			
18	27	3·17			
25	27½	3·16	14	36	2·96
Sept. 1	32	3·05	15	36	2·96
8	27½	3·16	16	36	2·96

London Premium on U.S. Dollar Securities—continued

Date.	Premium, %.	Securities $, per £.	Date.	Premium, %.	Securities $, per £.
1949 Sept. 19	8 †	2·59	1950 Mar. 15	15	2·44
20	4	2·69	22	15	2·44
21	5	2·60	29	15	2·44
28	11	2·52	Apr. 4	16	2·41
Oct. 5	12	2·50	12	15	2·44
12	14	2·46	19	16	2·41
19	13	2·48	26	16	2·41
26	12	2·50	May 3	16	2·41
Nov. 2	16	2·41	10	17	2·39
9	21	2·31	16	18	2·37
16	17	2·39	24	16	2·41
28	18	2·37	31	15	2·44
30	18	2·37	June 7	13	2·48
Dec. 7	16	2·41	14	11	2·52
14	16	2·41	21	12	2·50
21	14	2·46	28	11	2·52
28	14	2·46	July 5	11	2·52
1950 Jan. 4	14	2·46	12	12	2·50
14	13	2·48	19	12	2·50
18	14	2·46	26	12	2·50
25	15	2·44	Aug. 2	13	2·48
Feb. 1	13	2·48	9	13	2·48
8	13	2·48	16	14	2·46
15	13	2·48	23	13	2·48
22	13	2·48	30	11	2·52
Mar. 1	14	2·46	Sept. 6	11	2·52
8	15	2·44	13	12	2·50

* Daily, October 1–10, 1947, and September 14–21, 1949. Devaluation of sterling was announced Sunday, September 18, 1949.

† Unofficial, from *Financial Times*.

Sources :

October 1–10, 1947 : *Financial Times* market reports.

October 15, 1947, to March 31, 1948 : Direct estimates from comparisons of London prices and English equivalents of New York prices of four leading equities. The results are approximate only, and do not cover the full range of the premiums.

April 7–September 8, 1948 : *Investors Chronicle*.

September 15, 1948 and after : *Stock Exchange Daily Official List*, as quoted in the *Financial Times*.

For instance, with a premium of 17%, the securities dollar rate becomes $2·39, and the effect is that the sterling price of a U.S. share in London is the same as if the original American price were converted at the securities dollar rate instead of the official rate. Since the dollar premium and the securities dollar are different expressions of exactly the same concept, the terms are used indifferently in the following analysis.

History of the Securities Dollar

Between the beginning of the war and October 1947, a few specific overseas non-sterling securities remaining unrequisitioned

could be bought and sold between British residents at a negotiated sterling price which differed from the foreign price converted at the official rate. But the premium or discount was not uniform for all stocks denominated in any one currency, as it depended on the relationship between the supply of and the demand for specific holdings already in British ownership.

In October 1947, a considerable measure of freedom in dealing was restored. The position since then has been that, under licence, foreign (*i.e.*, non-sterling) securities may be exchanged without restriction between U.K. residents. Foreign securities can also be sold overseas if the proceeds are at once surrendered to the Treasury at the official rate (provided, of course, that the proceeds can in fact be repatriated here, like U.S. dollars), or re-invested [1] promptly and fully in other stocks in the country of the currency in which the original security was expressed. Thus British investors can neither retain a balance of foreign currency, nor acquire any for net purchases abroad other than through the re-investment of sales proceeds.

It was some little time before the full possibilities of these changes were grasped and the technicalities worked out. Only at the beginning of 1948 did a uniform premium become the rule, and not until September 1948, when the Inland Revenue first required inclusion of the U.S. dollar premium in valuations for probate, did the dollar premium become officially quoted in the *Stock Exchange Daily Official List* in its present form. The way in which the dollar premium has fluctuated in the course of its existence is shown in the accompanying table, which gives also the rate for the securities dollar corresponding to each premium.

Why the Dollar Premium Exists

Those who erroneously believe a securities dollar or pound to be equivalent to a monetary dollar or pound were apt before September 1949 to regard the dollar premium as the extent to which the official rate of exchange overvalued sterling. Yet the eventual 30·5% devaluation of the pound was in greater proportion than had been expected, and the dollar premium should under this argument have disappeared. But there has always been a

[1] Re-investment facilities overseas do not apply to Canadian shares or to those U.S. shares in the R.F.C. deposit, though such securities can be bought and sold between British residents. Canadian stocks can be sold in Canada, and the proceeds sold to the Treasury. Holdings in the original R.F.C. deposit can be sold direct to the Treasury. Newly acquired holdings of R.F.C. stocks enjoy the usual switching facilities.

premium of some sort, although for a few days it fell to a very low level.

The reason is that the dollar premium consists broadly of two groups of factors: exchange factors which are fundamental to all transactions in American shares, and the technical factors which reflect the *investment* merits of American shares in the aggregate or individually. Although these different influences seem to have worked in the same direction most of the time, it does not necessarily follow that they must always pull the same way, for a dollar premium is the resultant of different stresses, some of which may give rise to a premium and some to a discount when working in isolation. (A net discount can arise in theory, but not in practice, so long as dollar sales proceeds can be repatriated here and sold to the Treasury at the official rate.)

Exchange factors: (i) *Official exchange rate.* British investors are collectively interested in the official rate of exchange principally because that is the rate at which income is convertible. While income is not the only consideration in the short run, the capital values which affect even the speculator rest in the last analysis largely upon the expectation of future income by the person who buys from the speculator at one or more removes.

Now the income from a foreign security can, at any rate on the short view, be regarded as fixed, and the price of the stock in the principal market in which that stock is traded is the norm to which prices in subsidiary markets would tend, given free exchange rates and international security dealings. Under exchange control, a premium or discount here on the shares of any overseas country means that there is a disparity between the exchange rate at which the capital is bought and that at which the income is converted, and hence a difference in yield arises as compared with the local market.

If a foreign currency is thought to be generally under- or over-valued in terms of sterling because of economic and political factors, a sterling premium or discount on such securities is partly in anticipation of a change in the official exchange rate. Such an alteration would then reduce, cancel or even over-correct the disparity between the ratio of income to capital in the British and the foreign markets. Suppose in the summer of 1949 an American share had yielded \$5 a year on a capital cost of \$100, and the dollar premium here had corresponded exactly to the eventual exchange rate of \$2·80—it did not in fact ever rise so high—the share in London would have cost £(\$100 × 144% ÷ \$4·03), and would have yielded an income of £(\$5 ÷ \$4·03). After devaluation,

that income would have risen to £($5 ÷ $2·80), and the yield on the original cost would then have become 5% in the U.K. and the U.S.A. alike.

(ii) *Convertibility-preference.*—Expectation of a change in the official rate is not, though, the only reason for tolerating a yield differential on the same security. A premium can exist if any preference is shown at all—no matter how irrational the grounds—for dollar securities as compared with sterling, so long as exchange control precludes arbitrage in currencies and the equalisation of prices in all markets. If dollars are in fact preferred to sterling and cannot for any particular purpose be bought from the authorities at the official rate, they will in any free market open to them command a premium at any level whatever of that rate. Thus the securities dollar or, say, the current securities sterling rate in New York, is neither a true general equilibrium rate which the official rate should aim at nor an anomaly to be suppressed, because the stock markets' view of the unsuitability or otherwise of the official rate of exchange for the conversion of current income is only one element in the situation.

The behaviour of free markets under the war and post-war exchange control systems is making it clearer that the value of money is not only the quantity of goods that it will buy, but also the extent of the variety of things upon which it is effectively spendable. In short, convertibility is no less important than money's worth, and it is common knowledge that, on the demand side, dollars as compared with sterling enjoy what can for convenience be called convertibility-preference.

The securities dollar is merely a dollar's worth of American securities, and being subject to various limitations, it is less useful than a monetary dollar and does not possess the maximum value arising from convertibility-preference. It is, however, the next best thing that British residents can hold for any length of time, since monetary dollars which come into the hands of a British resident must be surrendered as soon as received at the official rate.

The essential value of the securities dollar, so far as it arises from convertibility-preference, lies in the right to choose time: to retain dollar securities in one form or another in perpetuity or to choose the moment to sell to the U.K. control, or to deal in the British market in such a way as to take advantage of fluctuations in prices. It is, of course, not practicable to distinguish the value of this option from the other exchange element. But the dollar premium probably no longer contains anticipation of a

change in the official rate, and is compounded of the time-option and of the resultant of those technical investment factors mentioned below which make it possible to make rough generalisations about the relative desirability of dollar and of British securities.

Technical factors : (i) *Yields.*—While it is notoriously difficult to produce valid international comparisons of yields, because so much depends on which shares are chosen, and on whether the two groups of securities selected are in fact comparable, it is usually accepted that Wall Street yields on equities have on the average been higher than British yields on shares of similar standing over most of the period during which the dollar premium has existed. Thus towards the end of July 1950 the Actuaries Investment Index showed average yields of 5·57% on 120 British industrial ordinary shares and the *Financial Times* 5·02% on thirty equities, while Standard and Poors reported average yields of 6·74% on American common stocks. American companies, moreover, have not been subject to dividend limitation.

(ii) *Market and cyclical factors.*—These are highly complex, and as far as the dollar premium is concerned, can be said to sum up the general British view of the course likely to be taken by Wall Street as contrasted with the London market. In recent years the two markets have by no means moved together, and during much, but perhaps not all of the time since switching facilities were granted the American economy has been regarded as the more favourable of the two for investors. If, for instance, it were feared that local American prices had become too high to last, consistent pressure to sell in London would depress the premium, while expectation of steady inflation in the U.S.A. would be one of the causes likely to raise the British demand for American stocks.

(iii) *Tax relief.*—There is an important if anomalous factor which affects those British taxpayers who hold American common shares. With American bonds and preferred shares, the British taxpayer is in the same position as if he held British securities. With equities, however, he can obtain tax credits which allow for a proportion of Federal taxes paid by the company before striking the balance available for dividend. It is as if he could offset a company's rate of profits tax against his personal tax liability on his share of gross divided profits before taxation.

Uniformity of the Dollar Premium

A British holder does not assess the relative merits of different American securities in quite the same way as Wall Street. Differ-

ences in yield on comparable British and U.S. securities can affect only specific shares. Likewise, the tax benefits concern only common shares, and to a different extent in different companies.

In spite of these differences, the dollar premium is in fact uniform because U.S. securities are freely interchangeable, and one securities dollar is regarded as useful as another in the same way that to a retailer of goods here one pound note is as good as any other pound note.

The continuous process of exchanging the less for the more advantageous dollar stocks must in principle affect the cash sterling share prices, which are a combination of the American prices and the prevailing dollar premium. Now demand here for a particular American share is not necessarily, nor even usually, satisfied by a purchase from some other British holder of that same share. Sellers can be either the original British investors, or dealers resident in this country who make exchanges in American markets. Say British holders of American stocks A, B and C wish to sell them, while other British residents want to buy American stocks D, E and F of equivalent aggregate value. The London market will buy A, B and C from the sellers for sterling calculated at the securities dollar rate and sell them for dollars in the U.S. market at the local dollar price, and with the proceeds buy D, E and F also at the local dollar price. Finally, D, E and F will be sold by the London market to the British buyers for sterling converted at the securities dollar rate, thus closing the circuit.

Hence demand for specific American shares which are not already in British hands will be reflected in an increased demand for those shares in the U.S.A., and in theory in a higher Wall Street price. Likewise U.S. shares held in this country which do not find a buyer here can be sold in the U.S.A., and other things being equal would depress the local price. The volume of dealing on British account would in practice seldom be enough to affect the American price noticeably. The point is that it is the U.S. price and not the dollar premium which is affected by shifts of demand, no matter where they originate, between individual securities. On the other hand, a consistent pressure here to sell or buy American shares generally of course depresses or raises the dollar premium, but does not give rise to differential percentages.

The reason for this is that so long as British holders of American securities are free to switch them in U.K. or American markets at choice, arbitrage among the London holdings will prevent the emergence of differential premiums. If the London premium on

share A were temporarily to become higher than on share B, a dealer would buy share B for sterling, sell it in New York and reinvest the dollar proceeds in share A, which would then be sold in London for sterling at a profit. The purchase of B and the sale of A in London would then tend to bring their sterling values into the same ratio as the American prices, and hence to equate the two premiums.

It is perhaps truer to say that arbitrage keeps differential premiums within such narrow limits that they are virtually at one level. The expenses of having to deal in the U.S.A. as well as in the London markets are quite measurable, and these arbitrage expenses permit the emergence of small differences such as arose in currency transactions due to the operation of the gold points before 1914. A small differential premium would not be quoted as such, but would be absorbed in the London sterling quotation, and would be seen to exist only on close comparison between the New York and London cash prices at any one moment.

Put in general terms, a sterling premium or discount on securities denominated in the currency of an overseas market will be uniform so long as the values of the securities relative to one another are determined in that overseas market, and British residents are free to effect exchanges there. The latter condition is not fulfilled in the case of Canadian securities and R.F.C. holdings, hence differential premiums arise for these shares. And in theory if shares of an American company were concentrated in British hands in such a way that London became the principal market for those particular shares, the sterling price would probably disclose a premium which differed from that on American securities as a whole.

The Size of the Dollar Premium

The final question—what determines the size of the premium?—is at once the simplest to answer and the most important. The market in which the values of American shares are established relative to one another is in New York and other U.S. centres, but the market in which the demand is manifested for American securities generally as compared with British securities generally is in this country.

If American shares could be freely bought in the U.S.A. with monetary dollars supplied at the official rate, the exchange control would run out of dollar resources unless these could be replenished by the remaining transactions in the balance of payments. If

dollars could be purchased at a free exchange rate, there would be no dollar premium as such, as the demand for dollars to buy shares would become merely one element in the current exchange rate. And if switching facilities were to be withdrawn, leaving U.S. shares exchangeable only between British residents, the effective premium would differ as between different securities. Instead, the situation that actually exists is that the exchange control permits dealings in U.S. securities in such a way that there is a direct sequence of sales and purchases between the securities held before October 1947 and those held now, and the commodity dealt in on the market which establishes the dollar premium is in effect the securities dollar.

The corpus of American securities in this country is not fed from outside sources, a few specific shares may have disappeared in the past because of sales without re-investment in the U.S.A., and the aggregate value is in constant fluctuation over a period not only because of U.S. price changes, but also because the underlying securities themselves are constantly changing. In the short run, however, the value of American securities in British hands is rigidly fixed, and on any one day the dollar premium expresses an equilibrium price, at which the quantity of all U.S. securities sold by some and bought by other British holders is exactly equal. The quantity in this connection is the American market value of all the American securities dealt in on British account either here or in the U.S.A. and is not, as with local share transactions, a quantity of shares. And this equilibrium price is that at which the marginal British holder of American securities is prepared to give up the right to his securities dollars and hold sterling instead, and thus evaluates the advantage of owning American securities generally in contrast with sterling.

Conclusion

To sum up this analysis, where exchange control prevents free interchange between international stock markets, a premium or discount on foreign securities (as compared with foreign prices converted at the official rate of exchange) arises whenever those securities are regarded collectively and on balance as more or less desirable than domestic shares, no matter what causes that preference. Belief that the official exchange rate is inappropriate and will be corrected is not the only reason, and may not even be the chief one. Nor need the various factors underlying the net preference all work in the same direction.

In the case of dollar stocks, a premium arose partly in anticipation of devaluation, and partly because American securities carry an option to choose the time (if any) at which to convert them into sterling, and thus share in some of the convertibility-preference that attaches to free dollars. In addition, there are a number of separate considerations of a technical or investment character which may on balance either increase or decrease the desire to hold American securities at any one moment.

While the importance of these different factors cannot be separated, it would seem from movements in the dollar premium since the autumn of 1949, when it fell sharply after devaluation only to rise to about half its pre-devaluation level, that the anticipation factor (anticipation, that is, of a revised official rate) never accounted for much more than half the premium, and at present probably does not enter into the picture at all. The immediate post-devaluation premiums covered the convertibility plus the yield, taxation and general market factors. It is, of course, no better than guesswork, but it looks as if from say May 1950 onwards short-term fluctuations have been caused by investment rather than by convertibility considerations. The latter, if not actually diminishing in importance as the supply of dollars to the world at large improves, is unlikely to vary much from one day to another.

Since the relative merits of different American shares are reflected in the U.S. market prices, and British holders are permitted to switch in U.K. or U.S. markets at will, the possibility of arbitrage precludes the emergence of differential premiums, even though securities equally attractive to American investors are not, for technical reasons, equally attractive to British investors.

Any preference for one American share as compared with another appears in the sterling price only if it causes movements in the American price. On the other hand, the degree of preference for American stocks generally as compared with British stocks generally is reflected in movements in the dollar premium. That premium on any one day is the equilibrium price at which the total quantity of American securities bought and sold are equal, as measured by aggregate dollar values.

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DIVERSIFICATION OF INDUSTRY

THE following note deals briefly with arguments for and against diversification of industry and with certain practical aspects of it.

I

An important argument against the pursuit of industrial diversification as a general policy is that it runs counter to the localisation in particular areas of industries of similar and complementary types. It therefore opposes the gains of industrial specialisation which, it is well known, are no less considerable than important. Especially, it militates against the low costs of production attainable by industrial specialisation. It does so either by causing the removal of part of the specialised industries elsewhere or by leaving them intact and introducing into the areas concerned industries of different sorts. In the former case, there is the serious risk that the part of the specialised industries removed will be driven to inferior locations. In the latter case, competing demands for the factors of production by the newly introduced industries may curtail their supply and drive up their costs to the specialised industries, while valuable external economies—such as industrial and commercial linkages, transport facilities and other specific service facilities—may be impugned.

Furthermore, to oppose specialisation in order to secure the advantages of diversification is wrongly conceived. For the history of industrial growth shows that, after a certain point, specialisation itself breeds diversity.[1] It does so by attracting industries subsidiary to the main industry, and later on these enter upon the making of products for other industries. It also does so by the need to employ the growing working population which the main industry is not able to absorb. Lastly, it does so by creating demands for industrial and social services.

For the reasons given above, and because thorough-going industrial diversification may lead to a less efficient allocation of productive resources by involving departure from the existing pattern of industrial distribution, a lowering of general productive efficiency and a raising of costs may not be avoidable. As contended hitherto by supporters of industrial diversification, the

[1] Cf. also *Report of the Royal Commission on the Distribution of the Industrial Population*, Cmd. 6153, g. 74.

central purpose of it is to attack unemployment. If that attack were aimed at reducing unemployment by seeking to improve the existing distribution of productive resources, so lowering costs, it would merit approval. In fact, the attack is rather directed to sharing more equally—as between one area and another—whatever unemployment may be experienced. To move productive resources to serve this end might be to depart radically from the pattern of industrial distribution which is consistent with the most efficient use of such resources. That would raise costs.

If, as suggested, the curtailment of industrial specialisation and the alteration of the present distribution of industry increased costs, export might be harmed. Moreover, industrial diversification is ordinarily regarded as peculiarly appropriate for areas very dependent upon capital-goods industries or export trades. That dependence, it is assumed, would be mitigated by introducing industries of contrasted type—*e.g.*, consumption-goods industries in the first case, and home-market goods industries in the second case. But since frequently capital goods enter substantially into export as well as the export trades themselves, the net effect of such diversification may be to reduce the proportion of the national productive resources devoted to export. For, while part of the industrial diversity postulated for these areas might be secured by transfer there of firms already existing elsewhere, probably the greater part would have to be obtained by attracting new enterprise to the areas. In so far as, under governmental control of industrial location, this caused manufacturers of consumption goods and home-market goods to obtain preference in access to factors of production, producers of capital goods and export products would be starved of those factors. Lastly, if, as may be assumed, the pursuit of industrial diversification reduced the geographical mobility of labour, again export might suffer. For export industries need more labour than they have now if they are to grow sufficiently to achieve, and to maintain, a favourable balance of payments; and it is doubtful if that additional labour can be obtained without some geographical movement of labour.

This restraint upon the territorial mobility of labour would handicap adaptation, not only by export industry, but also by industry in general, to economic change. Yet the need for such adaptation may conceivably be greater in the foreseeable future than in inter-war times. Thus, this country's commitment to export of industrial goods will be larger than then, and fluctuation in export is of greater magnitude than in domestic production;

high and stable employment programmes will call for spatial movement by work-people; and new and newer industries will need to be developed or expanded to countervail the contraction of old, staple industries—on which in future this country may have to place less reliance.

It could be argued that industrial diversification is not an effective antidote to cyclical unemployment, or unemployment caused by a general depression. For cyclical fluctuation may drive down all industrial activity to low levels—and for not inconsiderable periods. Nor is that possibility lessened by this country's great commitment to export and the probability that in future the range of production for export will be wider than during the last three decades. In the case of general depression, industrial diversification, *ex hypothesi*, would be limited in its prophylactic capacity.

To turn to another line of argument, experience shows that industrial diversification, *per se*, may not prove in practice to confer the theoretically feasible advantage of insulating local areas from severe unemployment. Instances can be found of diversified places which, during the inter-war period, experienced both serious and long-lasting unemployment. These include Hull, Glasgow, Great Yarmouth, Grimsby, Leith, Bridgwater and Bideford. On the other hand, there are examples of places with specialised industry that then had much less severe unemployment—often, indeed, below the national average. These include Coventry, Rugby, Burton-on-Trent, Northampton, Derby, Kidderminster, Dursley, Kettering, High Wycombe, Stroud, Elland and Tiverton.

On the score of practical efficacy again, the point has to be met that the places that are the more obvious candidates for industrial diversification are sometimes those in whose case it is less feasible to achieve it. Such candidates include places committed to high industrial specialisation where the labour force is of substantial size. For these, a given dose of diversification is potentially less effective than where the labour force is not substantial—*e.g.* Sheffield on the one hand and Redditch on the other. Again, coal-mining areas, with their strong dependence upon coal, and numerically substantial labour forces, are such candidates. But they are notoriously deficient in sites suitable for alternative industry. Moreover, they often lack the complex of utility services and suitable, trained labour that alternative industry requires. Small towns—such as Yeovil, Dursley, Consett, Tiverton, Scunthorpe and High Wycombe—that rely heavily upon one firm or industry for their primary income,

and on that ground are clearly eligible for diversification, may have to import labour for the new industries. Where such small towns are remote from population, or are situated in areas of high labour demand, that may not be easy.

It has to be realised that where diversification of one place is achieved by removing industry from another, the latter does not remain unaffected. Frequently, less diversification will result in the place losing industry. In any event, the lowering of demand for labour there may necessitate a movement away of labour. Where diversification is brought about by introducing newly originating industry, again what one place gains is another's loss. Whether the one exceeds the other will depend upon the particular circumstances of each case.

In reality, less economic disturbance may result if diversity is secured by varying the products of firms already located in given places. Where this is practicable the need to shift economic resources of various kinds, and the repercussions following upon such shifting, may be minimised. In particular, the necessity to enlarge local populations, and to provide the additional social capital required, may be in large part escaped. That would *pro tanto* economise resources.

It is a commonplace that the majority of urban areas in the country—to say nothing of rural areas—clamour for diversification of their industries. To respond to all these clamours would not be possible except over a long period of time. Even then there may be insufficient mobile industry to satisfy the demands for it.

Lastly, it may be doubted whether, as yet, the criteria by means of which to determine: (*a*) the need of an area for industrial diversification, and (*b*) the best means of accomplishing it having regard to the economic interest of the country as a whole, have been satisfactorily established.

II

Arguments in favour of industrial diversification may now be stated. In the main, they are rebuttals of the unfavourable arguments. They are stated first, and the positive arguments for industrial diversification follow.

To start with the contention that the conception of industrial diversification is erroneous, since, after a point, specialisation always breeds diversity, this is challengeable. For, as Hoover [1] points out, specialisation is cumulative—feeding on itself. The

[1] E. M. Hoover, *The Location of Economic Activity*, p. 289.

history of industry certainly contains many instances of this. Again, it is less frequently the case that subsidiary industries serve the needs of other industries as much as those of the main, specialised industries. The subsidiary industries therefore intensify specialisation rather than promote diversification. Perhaps the best instance of the diversity of products brought about by the extension of subsidiary industries is the Birmingham area. But the most recent survey [1] of that area shows that these are more dependent upon the motor-vehicle industry than upon anything else. To rely, then, on subsidiary industries to evoke true diversification is to be unrealistic. Lastly, a specialised industry does not always breed local subsidiary industries on a substantial scale—*e.g.*, coal, tinplate, chemicals, jute and pottery.

As for the assertion that diversification is inimical to specialisation of industry, it may be asked if there is any over-riding reason why specialised and diversified industries should not live and flourish side by side. Perhaps the readiest way of answering this question is to ask another. What, in reality, would prevent alternative industry from settling in areas of specialised industry? One manifest difficulty is lack of industrial sites. Experience shows, however, that this is not universal—it is prominent only in large, congested urban areas, in coal-mining districts (in certain areas) and in places where local topography imposes limits. Moreover, where sites do not already exist, again experience shows that more often than not they can be created. While sometimes these may have to be outside the existing industrial zones, ordinarily they can be devised within "labour areas"—*i.e.*, within the distance from home to which work-people are disposed to travel. Another difficulty is that the available labour may be already taken up by the specialised industry. This has been true in the abnormal conditions since the war; but under normal conditions it is not usually the case that all the labour reserves of towns and outlying districts are fully mobilised. And short-distance movement of labour, where it would have to be resorted to, is more practicable than long-distance migration. Still another difficulty is that the essential industrial and social services—such as utility services, housing and education—may be fully utilised already. The remedy of extensions or new construction is, however, generally feasible. Few other difficulties are major ones.

To turn now to the assertion that industrial diversification will probably raise the costs of specialised industries, it would be rare for it to do so by causing these to emigrate to inferior

[1] West Midlands Plan (not yet published).

locations. For such industries ordinarily do not lend themselves to transfer. A number of them are chained to the spot because they are extractive industries. Others depend on the existence of factors of production which they could not command elsewhere. In the case of still others, the productive resources essential for them could be brought into being elsewhere only after a long time had elapsed—a time too long to be tolerated where the need for diversification is urgent. But in the few instances where such emigration was deemed to be essential it would not inevitably be to an inferior location. To assume this is to take the view that all existing locations are, and forever will be, the best. That cannot be true. The factors that affect location are never constant, but alter as economic conditions alter, from time to time. It is therefore at least possible that other places will afford as efficient a site as that from which the move is made. This possibility is reinforced by the fact that private industry has sited but a few of this country's industries in one part only of it. It is further reinforced by the important fact that in recent times private industrialists engaged in specialised activities have voluntarily shifted their locations.

What, then, of other possible causes of extra costs for the specialised industries which might be caused by industrial diversification? The most likely one is that, by increasing the demand for factors of production within specialised areas, it would raise their price. That is certainly possible. Yet the diversified industries would, by definition, demand fewer of the factors most in demand by specialised, existing industries, and more of those least in demand by these latter. For this reason, besides, the diversified industries are more likely to uncover hidden reserves of labour, and to put these to use. Specialised industries alone, too, are more prone to carry a labour surplus which is fully employed only at exceptional times than a group of mixed industries. Sometimes, in addition, it may be possible for specialised and diversified industries to make their seasonal and peak demands for labour at different times. Finally, it may be possible to draw upon spare labour from nearby districts; and, if the pace at which diversification is undertaken is restrained, it may be feasible to maintain a balance, in the individual areas, between total demand for labour and its supply.

To deal with the contention that diversification would raise costs of specialised industries by subtracting from the external economies available to them is not easy. It would seem, however, that since there need be no disturbance of these in the physical

sense they could continue to function as before. In particular, the advantages of proximity to associated and related producers would remain. All the varied services requisite for the specialised industries would continue; nor need their flow be abated. For, if the diversifying industries made calls upon these—*e.g.*, for railway transport, utility services, ancillary industries, educational and training facilities—ordinarily these could be met by improved methods of utilisation or by an increase of capacity. Only if diversification were undertaken hastily and on a massive scale need damage be done to the specialised industries' external economies: and both these errors could be avoided.

As for the all-round raising of industrial costs, which, it is argued, would occur because diversification would entail a departure from the existing distribution of industrial resources throughout the country, it is pertinent to remark that besides the costs falling upon private industry the costs falling upon the community generally should be taken into account. For these latter involve the using up of resources no less than the former. Since, until the passing of the Distribution of Industry Act, 1945, private industrialists located their enterprises with less regard for the costs falling upon the community than for their own private costs, it follows that the existing distribution of industrial resources is less than optimum for both kinds of costs together. Therefore, to alter it to take account of both kinds of cost would represent movement towards that optimum. It could hardly be the case that, to change the existing distribution of resources by removing specialised, or immobile, industries from their present locations would lower the aggregate of both kinds of cost. For such removals would probably increase private costs and costs falling on the community as well. Private costs of specialised industries would probably be raised because the essence of specialisation is that it affords low private costs. Moreover, the productive equipment of such industries is frequently so bulky, so physically intertwined by the linkage of successive processes and so dependent for its functioning upon the presence of a complex of external economies that the costs of removing and reproducing all these elsewhere would be onerous. These findings apply besides, if in lesser measure, to immobile industries. As for costs falling upon the community, it is reasonable to expect that these would also be raised because of the necessity for duplicating all the various kinds of social equipment in the new locations.[1] Further-

[1] Even if new, alternative industry substituted the specialised industry, duplication could not be wholly avoided. For this would need a different social

more, sometimes, if not always, private industrialists would be unwilling to suffer additional private costs by moving elsewhere without compensation by subsidy, so that costs falling on the community would be enlarged by its amount. The conclusion is that diversification would not normally seek to alter the existing distribution of industrial resources by causing specialised or immobile industries to migrate.

Diversification could, however, alter the existing distribution of industrial resources by influencing the location of non-specialised or mobile industries by causing them to go where otherwise private industrialists might not take them. Being mobile, there is a presumption that private industrialists could operate them economically in a variety of areas. Some of these areas would be those where diversification was needed. Others where it was needed would be areas in which it was less, or least, feasible for private industrialists to operate them economically. In these cases, however, it would be possible for the saving of costs falling upon the community by diversification to more than compensate the extra private costs. Suppose that such areas were not, in fact, diversified, because the diversifying industries went elsewhere instead. Instances of the costs falling to be met by the community then—enlarged if the areas in question experienced localised unemployment—are the sum of economic resources involved by the probable necessity to undertake extra, or duplicated, physical construction of many sorts elsewhere (such as additional factories, houses, roads and streets, utility equipment, public buildings and kinds of construction required to provide private services); by inadequate maintenance of social and private capital in the non-diversified areas occasioned by the decline of population resulting from labour migration to elsewhere; by the unemployment of labour not able or willing to migrate; by restrictive practices on the part of labour in the non-diversified areas owing to dread of unemployment, and a fall in its working efficiency caused by the depression in its wages; by losses due to the tendency of specialised industries in the non-diversified areas to use labour wastefully; and, possibly, by greater congestion of industry and people that might be instigated elsewhere. But the sum of economic resources saved to the community would have to be offset against the sum of losses of economic resources.

texture and social equipment of different proportions; some specialised labour would follow the specialised industry-causing redundancy of old social equipment; and new industry would be slow to develop—making old social equipment temporarily surplus.

Instances are the physical construction (such as new factories or improvements of utility services) which might have to be undertaken if diversifying industries went to the areas in question instead of elsewhere; the additional services that might be needed by these (such as new industrial sites, training of labour, special transport facilities and the provision of amenities); and the costs of any subsidies that might have to be granted to private industrialists "steered" to the areas—to make good extra costs imposed upon them. The net balance of costs falling upon the community should then be compared with the net saving of costs to private industrialists by going elsewhere instead of to the areas in question. Only if the net balance of costs falling upon the community were smaller than the net saving of costs to private industrialists would the decision not to diversify the areas be warranted; and that is unlikely. The comparison would not be easy. It would be especially difficult to calculate costs falling upon the community—particularly because some costs would be once-for-all, while others would be continuous. Both would have to be translated into costs per annum.

This analysis serves to allay the fear that industrial diversification necessarily imposes cost disadvantages by causing maldistribution of economic resources. Generally speaking, specialised or immobile industries would remain where they are, and retain the cost advantages of those locations—or suffer cost disadvantages which are not significant. Diversifying industries, being mobile, could go to some parts of the country without suffering cost disadvantages; and to other parts without hurt to the economic interest of the country where the higher costs falling upon private industry are more than compensated by the lower costs falling upon the community.

To turn now to the criticism that a prime motive of industrial diversification is to share unemployment more equally over the various areas of the country, this may be less deserving of censure than at first appears. For unemployment shared more equally than in inter-war years may be a more bearable burden. The economic consequences of such sharing may be nil—although heavy unemployment, by lowering work-people's efficiency and morale, raises costs, and possibly after a point heavy unemployment breeds further unemployment—but the social consequences are favourable.

The earlier argument, which claimed that export would be harmed because diversification would raise costs, has been dealt with by the counter-argument given above. The further con-

tention that, under a policy of controlled industrial location, export industries might be denied access to factors of production because diversifying industries would receive preference in the allotment of factors, calls for answer. That answer can be given only in normative terms. A government which pursues a policy of high and steady employment should not rank the needs of diversifying industries for factors above the needs of export industries for factors. Nor would it be obliged to do so. For, presumably, the supply of factors would not be exhausted by the demands alone of the export industries.

It is harder to meet the point that industrial diversification in certain towns nevertheless did not save them from experiencing serious unemployment during inter-war times. Not enough is known about such instances to warrant firm conclusions. But it would seem that what such towns lacked was sufficient demand in total for the labour available. This might be due to various causes. One may be that the diversified industries were not present in sufficient strength. Another may be that they were not sufficiently independent of the main industries. Or they may have relied too much upon local markets. Lastly, it may be that they were not expansive industries. Whatever the causes, however, the empirical argument supporting the contention under review can be met by a like argument. This refers to the much greater number of cases where, as a result of appropriate and sufficient diversification, unemployment was held below national levels during years when, in the above-mentioned cases, it was above these.[1]

To deal with more practical criticisms, to deprecate diversification because it is of least effect where the need for it is greatest is not admissible in denial of its efficacy. In such cases diversification is comparatively ineffective because there is too little of it relatively to the volume of specialised industry. If there were more, therefore, it would be more effective. To the argument that there are insufficient diversifying industries to serve every area in the country, the reply is that this does not question the principle inherent in industrial diversification—it merely cites a limiting factor.

There is more substance in the statements that the criteria for applying this principle have not been established, and that the means of diversifying areas so as to have regard to the economic

[1] To select instances from different geographical areas, mention may be made of Bristol, Gloucester, Reading, Exeter, Slough, Watford, Luton, Birmingham, Wolverhampton, Northampton, Nottingham, Leicester, Shrewsbury, Manchester, Leeds, Halifax, Doncaster, Darlington, Edinburgh and Perth.

interest of the country generally are still subject to qualification. These are subjects which might profitably engage the attention of economists—especially in view of the pronouncements of the Royal Commission on the Distribution of the Industrial Population,[1] the White Paper on Employment Policy,[2] the Distribution of Industry Act, 1945, and the Town and Country Planning Acts, 1947. Something is said on this matter later.

The chief positive arguments for industrial diversification may now be stated. The first is the need to counteract the abnormal industrial specialisation of certain areas. The central reason is to prevent damage—perhaps serious and irrevocable damage—to the economy of those areas arising from cyclical contractions of demand, or export fluctuation or the decline of predominant industry. The most effective remedy—the maintenance of a high and steady level of national economic activity—may fail to generate enough demand for the products of the specialised industries in question, such as shipbuilding, marine engineering, cotton and tinplate. This remedy may therefore not avail to prevent localised unemployment in specialised industrial areas. Other remedies, such as expenditure upon local public works or specific subsidies, may be economically less meritorious than industrial diversification. The assertion, made previously, that this latter would not be effective against a downward cyclical movement or general economic depression cannot be pressed without qualification; for neither affects every type of industry equally. Some types, indeed, are relatively immune; and these include industries lending themselves to industrial diversification. Another reason, but a minor one, is to mitigate marked seasonality of output and employment in areas of high specialisation—*e.g.*, coal-mining and the manufacture of motor vehicles.

The necessity to secure flexibility in the economic system of this country constitutes a powerful argument for industrial diversification. It has been referred to by Prof. W. A. Lewis in a recent article.[3] Such flexibility may be more—possibly much more—essential in future than during recent decades. For the inevitable diversion of more industrial resources to foreign trade will enjoin that these resources should be able to move into different uses as the nature, composition and size of foreign trade alter. Certainly, they require to be more flexible than those devoted to domestic production. But, besides, some resources

[1] Cmd. 6153. [2] Cmd. 6527.

[3] *The Manchester School of Economic and Social Studies*, Vol. XVI, No. 2, p. 162.

used in domestic production may at times have to be adapted to production for export, or to take the place of discarded or unobtainable imports. Moreover, the production of goods for export may have to embrace a wider range of goods in future, and to be spread more widely over the country than in the past, thus requiring adaptability to changes of production in more places.

Success in sustaining a high general level of employment will call for the ability to transfer resources from one sort of use to another. More specifically, particular areas that come to suffer localised unemployment for any reason—such as the downward secular trend of the dominant industry or misfortune encountered by the principal firm—may have to rely upon diversification as their main, or even sole, remedy.

The possibility of technological innovation, sometimes rather far-reaching and quick, may not be ruled out; and that would give rise to changes in the uses and the ratios of factors of production. On the other hand, high general employment, insufficient or badly distributed housing, substantial social-service benefits available over the entire national area, the increased practice of determining wages upon a national basis, the rise in the average age of the working population and opposition to massive migration—especially by the inhabitants of Development Areas once bitten, twice shy—may restrain geographical mobility of work-people. Industry may therefore have to go to work-people more than it did before the war.

Industrial diversification would assist the transfer of productive means between varying uses, since it would lessen the necessity to move them over long distances. Generally speaking, the more extensive the range of industries in particular areas the easier it would be to change over production. Moreover, time would be saved. Diversification would be outstandingly useful in coping with labour thrown out of work but not willing or able to take the geographical strides to regain employment elsewhere. For it makes use of the knowledge that work-people change their industry more readily than they trek elsewhere. It would also breed that variety of working ability and resilience of occupational quality that would be required, but would not otherwise be forthcoming, when output in specific areas had to be altered. Correctly selected, diversifying industries may provide the growing points needed by districts suffering depression or sub-normal rates of growth—giving them that degree of industrial flexibility without which they would persist in the doldrums.

To use more fully the productive resources that this country

has, and to use them more efficiently—thereby saving costs—are both desirable. Thus, it is desirable that work-people who have industrial capacities that are not effectively utilised by specialised industry in the various regions of the country should be enabled to put these to better use. Again, it would be advantageous to provide opportunities for employment for persons not able to find work because sufficient variety of industry does not exist locally—such as women (sometimes men), girls (sometimes boys), older persons and work-people suffering from industrial disability or disease which prohibits continuance in their former employment. In some areas it would appear that labour not absorbable by primary industry presses into secondary industry.[1] It might be preferable to economise labour in this latter by creating more openings in other primary industry. It would be a gain if the tendency of specialised industry to use labour prodigally (by maintaining a labour reserve, and by being relatively immune from competition by other users of labour because it is the largest buyer) should be counteracted. Where there is congestion of industry and population which causes resources to be spilled in overcoming it—*e.g.*, in slower transport of goods and longer travel to work, and as a result of diminishing returns to other services—there would be advantage in thinning that congestion. Lastly, where present locations of industrial firms impose costs upon the community which exceed the differential gain to private industry of these over alternative locations, movement of firms to the alternative locations would reduce aggregate costs. All these advantages are capable of being secured, in varying degree, by means of industrial diversification.

Lastly, the appropriate practice of industrial diversification would attack the waste of resources that characterised the inter-war years by restricting the duplication in certain parts of the country of private and social capital equipment already in existence elsewhere. That came about, in large measure, because new or expanding firms frequently avoided going to areas where economic depression caused such capital equipment to be spare or under-used, and moved instead into areas where it was already more or less fully utilised. It also came about because persons and local authorities in a number of areas containing specialised industries miscalculated the capacity of these to grow and pro-

[1] Cf. the substantial differences in the ratio of secondary to primary employment that are found in different areas. Doubtless there are many causes of these divergencies; but it is observable that, when primary industry fails to expand as fast as the working population, secondary employment tends to increase.

vided capital in excess of needs, meanwhile causing new industry to go elsewhere by preferring to rely upon the old industry. Lastly, it was due to the transfer of existing firms from areas of lesser to areas of greater industrial and human concentration. Enlightened and suitable industrial diversification, by steering new and expanding firms to areas having spare, or under-used, private and social capital, by checking undue reliance upon specialised industry in particular areas and by preferring locations in non-congested areas, could reduce duplication.

What verdict is arrived at by a consideration of the arguments for and against industrial diversification? It is that the arguments in favour prevail. While this conclusion rests on the balance of all the arguments, it is fundamentally based on the conception that maximum industrial specialisation represents an inferior use of resources compared with industrial specialisation tempered by industrial diversification.

III

This finding having been expressed, a few suggestions may be made concerning the practice of the policy of industrial diversification. First, if, as is to be assumed, it is fostered by the State, care should be taken that industrial diversification is not carried too far. The danger of doing so is a real one. For the demand to be diversified, as a means of insurance against local unemployment, emanates from most local authorities and local communities. The State may find it difficult to resist claims that have little or no economic justification. Moreover, in the absence of an accurate measure of industrial diversity, to be certain of success there may be a tendency to overdo the introduction of alternative industry. Lastly, inevitable uncertainty about future economic conditions—and especially about the future of important industries—may conduce to a similar outcome.

The criteria by means of which to determine the need for diversification, its volume and appropriate types call for further study. There may be broad agreement about essentials, but not on particular aspects. For example, of two local areas, one of which is specialised mainly to export, and the other to capital goods, which is the more in need of diversification? Initially, the answer may be the former. But this may produce goods the demand for which is comparatively inelastic—even during cyclical downturns; while the latter may be extremely committed to supplying goods the current demand for which is swollen by war-

time destruction but the replacement demand for which is low. Conversely, the export area may be at present enjoying a boom in the demand for its consumption goods, but in future may find that its high costs, buttressed by a rigid economic structure and out-moded capital equipment, cause a collapse in foreign demand. But the area making capital goods may be supplying domestic demands for a product formerly imported but at present produced at competitive cost, and later able to be produced in this country at costs below those of foreign suppliers. Moreover, the former area may be capable of benefiting to no more than an inconsiderable extent from general measures to maintain a high level of domestic employment, while the latter may be capable of benefiting considerably therefrom.

Again, what of the need to diversify districts engaged predominantly in coal-mining? One extreme view is that, once the coal is exhausted, or mining costs become diseconomic, such districts become moribund and should not receive alternative industry. Another extreme view is that alternative industry should fully absorb the labour discharged from the mines and also future accretions of population unable to find employment in coal-mining. Neither view is likely to satisfy economic considerations. The first view probably under-estimates the costs falling upon the community; the second probably over-estimates these. Again, the first view probably assumes that all coal-miners are mobile—even over long distances; the second probably forgets that, even assuming the existence of the normal proportion of physically disabled and old miners, labour mobility within the coal-mining industry does exist. As a result, some, at least, of the miners thrown out of work in one district will move to other pits within travelling distance. (A number of Lanarkshire miners have recently moved farther—to Fifeshire.)

To take another case, should all one-industry towns be diversified? The naïve view may favour this. But some one-industry towns promise to maintain greater stability of output and employment than others—because the demand for some products is more inelastic than for others; because the industry in certain towns may gain by imperfect competition (*e.g.*, product differentiation), while that in others may be vulnerable to severe competition; or because in some one-industry towns there may be real diversity within the industry but not in other such towns.

Finally, should districts that are predominantly agricultural be "balanced" by a modicum of industry? One school of thought, by projecting the present situation of agriculture into the

long-term future, may oppose the injection of industry into agricultural districts; another school of thought may take quite a contrary view.

All that has been said above relates only to the question of whether or not to diversify. When that has been settled there still remain for determination the problems of how much, in what order and of what sort? It is apparent that these are not easy to solve. Nor are these the only practical issues which have to be met and dealt with; for the technique, or methods, of industrial diversifications profoundly influence the possibilities of its success. Something may now be said about these matters. The answer to the question of how much diversification turns, mainly, upon the needs for it of different types of area. Those areas which are most vulnerable to localised unemployment—*e.g.*, export areas, areas heavily committed to capital goods and areas extremely dependent upon a narrow range of industry—need more diversification than others. Those with larger labour forces in such vulnerable industries plainly need more than those with smaller labour forces. Areas containing industries which are less capable of benefiting from national measures to combat unemployment have claims for a fuller measure of diversification than those which are more capable of receiving benefit. In some parts of the country labour is less fully utilised—because of lack of employment opportunities, or under-employment—than in others; and they have superior claims. In others again, the aggregate of private and community costs is lower than in districts where either of these much exceeds the other; and the former parts of the country should be diversified in fuller measure.

The order of treatment by diversification is mainly determinable by considerations of the sort just mentioned. But the time factor in vulnerability to localised unemployment needs to be taken into reckoning as well. For the process of effecting the industrial diversification of an area is inevitably slow. This suggests that areas needing more of it, absolutely, should be preferred to those needing more of it, relatively. Again, areas that are likely to endure unemployment of longer duration have stronger claims for early attention than areas where unemployment promises to be acute rather than chronic.

The question of what sort of diversification poses difficulties. But, plainly, the alternative industries to the main ones should be suited to the industrial capacities of the work-people they are intended to employ.[1] For example, shipbuilding workers rendered

[1] Vide Tress, *The Manchester School*, Vol. IX., No. 2, p. 143.

surplus by reduction in shipbuilding will need employment for males of a constructional kind; but surplus cotton workers would be largely females who might readily be transferred to quite complex forms of lighter engineering. Furthermore, the alternative industries should ordinarily differ in type from the main or specialised industries. Thus, they should differ in their cyclical movement and amplitude, and serve different markets. If the principal local industries promise to contract, the diversifying industries should be capable of achieving expansion.

As for the technique, or methods, of diversification, the readiest, and the most facile, way of achieving it is by the self-diversification of specialised firms already existing in an area. That could be done by adapting products so as to serve the needs of varying markets, or by adding new products with new markets. Where this method is not feasible, less economic disturbance may result if diversification is brought about by means of new firms or expansions of suitable old ones rather than by the physical shifting of firms already located. But in areas where industry is congested, where labour is in very short supply and where it is desirable to reduce population, some transfer of industry elsewhere may not be avoidable. Where, however, such transfer takes place, care should be taken that the gain from diversification in the receiving area is not outweighed by the loss from reduced diversification in the losing area. Moreover, the locational needs of both transferred industries and new and expanded ones should be recognised—especially those of them that are less mobile. This does not conflict with the dictum stated earlier that both the costs falling upon private industry and upon the community should be reckoned jointly. But it would be wrong to assume that where the costs to private industry are least, the costs for the community are most; and vice versa. Data are needed about both kinds of cost, so that both can be regarded in reaching decisions about location. To help business firms in their search for, and assessment of, locations it is useful for a central government department to provide relevant information accumulated by its research agency—experience in the working of the Distribution of Industry Act, 1945, demonstrates this. Moreover, it is for a government department to calculate costs falling upon the community, since necessarily it is best fitted to do so. On the important matter as to the speed with which diversification should be carried out, mistakes are likely to be fewer if it is not hurried; for time is needed to weigh all pros and cons and to adapt the means available to the ends desired. Besides, since it has been argued above that

more reliance should be placed upon new industry and expansions of old than upon deliberate industrial transfer, the pace must be adjusted to that at which new industry and expansion of extant industry occur. Furthermore, to proceed too quickly might involve disturbance to current economic activity of an avoidable kind. Finally, not only the technique of diversification, but also its economic aspects and its social effects, need further study.

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ECONOMICS AND THE SOCIAL SCIENCES [1]

THE problem that this paper is concerned with is somewhat narrower than the title suggests. To begin with, I shall be concerned with the relationship between economics and the social sciences only from the point of view of the economist. The interdisciplinary problem will be discussed, in other words, from the vantage point of the economist rather than from that of the sociologist, the anthropologist or the psychologist. Secondly, "economics," as the term is used in this paper, is intended to refer to what may be best described as "orthodox economics." Since by orthodox economics we customarily refer to the theoretical systems of the classicists, the praxeologists, the general interdependence economists and finally the neo-classicists and the aggregative economists, the discussion will not be concerned with two schools of thought which from some points of view may be as significant as the orthodox. I am referring, of course, to the Marxists and the institutionalists. Although, in view of space limitations, this omission is mandatory, it is a regrettable one in so far as the methodological relationship between Marxian or institutional economics and the other social sciences is significantly different from that prevailing between the latter and orthodox economics.

Closer consideration of the problem of the relationship between economics and the other social sciences makes it amply clear that its correct formulation depends on the successful solution of a somewhat different problem, namely the problem of the empirical relevance of economics. It should be obvious, for instance, that, if economics is structured as a pure science while the other social sciences are structured as empirical sciences, the very question of a relationship between them becomes irrelevant. Since the implications of this proposition are important for all that follows, I should like to dwell briefly on one or two variants of what may be called "pure economics." In order to make the discussion more effective, we must consider briefly the nature of pure sciences.

Pure sciences are tautological in character. Theorems, derived from postulates through entailment or logical implication, are necessarily true, *if* the postulates are true. The theorem merely re-asserts what was already implied in the postulates. Nothing

[1] This paper represents the substance of an address given at the 1950 meeting of the Midwest Economic Association.

objectively new is asserted, though " its content may well be *psychologically new* in the sense that we were not aware of its being implicitly contained in the postulates." [1] Theorems of axiomatised deductive systems, therefore, can never come into conflict with reality. Their certainty, however, is purchased at very high cost, since they are devoid of any factual meaning.

It is well known, of course, that a pure science can be transformed into an empirical one under certain conditions. The transformation of pure geometry into physical geometry is a case in point. The process in this case involves two steps. First, the primitives, the concepts, that is, for which no definitions are provided within the axiomatic system, are epistemically correlated [2] to operationally defined concepts with empirical content. As soon as this is done, the postulates take on truth-value, they may be considered, that is, as being either true or false. Secondly, we must engage in a process of confirmation of the postulates. This, however, is a rather arduous process fraught with the danger of error. Essentially it involves the derivation of operationally meaningful theorems [3] from the postulates which can be tested against the facts. If the observations do not contradict the operationally meaningful hypotheses, we may accept the theory provisionally. If the facts contradict them, the theory has been disconfirmed. In such a case we must turn to axiomatic systems which are founded on different postulates in the hope that a theory not inconsistent with the observations will emerge. Although it is not claimed that this is the only procedure available for transforming a pure into an applied science, it must be asserted that all empirically relevant hypothetico-deductive systems resemble this pattern from at least a structural point of view.

An outstanding example of an economist who does not attempt to confirm his theory either via direct confirmation of the postulates or via indirect confirmation through verification of deductively derived theorems is provided by Ludwig von Mises. In his recent book on *Human Action* he states that

> " The scope of praxeology is the explication of the category of human action. All that is needed for the deduction of all

[1] C. G. Hempel, " Geometry and Empirical Science," in Herbert Feigl and Wilfrid Sellars, *Readings in Philosophical Analysis*, New York, Appleton-Century-Crofts, Inc., 1949, p. 241.

[2] For a definition of epistemic correlation see F. C. S. Northrop, *The Logic of the Sciences and the Humanities*, New York, the Macmillan Company, 1947, pp. 119–32.

[3] For a definition of the concept of " operationally meaningful theorems " see P. A. Samuelson, *Foundations of Economic Analysis*, Cambridge, Harvard University Press, 1947, pp. 3–6.

> praxeological theorems is knowledge of the essence of human action. It is knowledge that is ours because we are men; no being of human descent that pathological conditions have not reduced to a merely vegetative existence lacks it. No special experience is needed in order to comprehend these theorems, and no experience, however rich, could disclose them to a being who did not know a priori what human action is. The only way to a cognition of these theorems is logical analysis of our inherent knowledge of the category of action. We must bethink ourselves and reflect upon the structure of human action. Like logic and mathematics, praxeological knowledge is in us; it does not come from without." [1]

Mises's a prioristic position coupled with the complete lack of any traces of confirmation procedures must needs lead us to the conclusion that his system is empirically irrelevant.

A somewhat more sophisticated approach also leading to pure theory construction is much more popular with economists, and finds a rather elaborate expression in Professor Robbins's *Essay on the Nature and Significance of Economic Science*.[2] Since the conceptual framework that underlies Robbins's analysis is generally employed by both pure and empirically relevant economics, it seems desirable to state it as explicitly as the limitations of space permit. I am referring to the framework of human action. In the words of Talcott Parsons [3]

> " The first salient feature of the conceptual scheme to be dealt with lies in the character of the units which it employs. . . . The basic unit may be called the ' unit act ' . . . an ' act ' involves logically the following : (1) It implies an agent, an ' actor.' (2) For purposes of the definition the act must have an ' end,' a future state of affairs toward which the process of action is oriented. (3) It must be initiated in a ' situation ' of which the trends of development differ in one or more important respects from the state of affairs to which the action is oriented, the end. This situation is in turn analyzable into two elements : those over which the actor has no control . . . and those over which he has such control. The former may be termed the ' conditions ' of action, the latter the ' means.' Finally (4) there is inherent in the conception of this unit, in its analytical uses, a certain mode of relationship between these elements. That is, in the choice of alternative means to the end, in so far as the situation

[1] Ludwig von Mises, *Human Action*, New Haven, Yale University Press, 1949, p. 64.

[2] Lionel Robbins, *An Essay on the Nature and Significance of Economic Science* (Second Edition), London, Macmillan and Company, 1935.

[3] The Talcott Parsons rather than some other formulation of the framework is selected because, in the judgment of the author, it is by far the best available in the literature.

> allows alternatives, there is a 'normative orientation' of action." [1]

As soon as we postulate that the norm relating means to ends is that of *intrinsic rationality*,[2] the maximisation of a utility index is implied, and the foundation stone of economic analysis has been laid. Attacks against the postulate of intrinsic rationality on the grounds that it implies the postulation of the economic man or the hedonistic calculus were certainly justified in the case of a number of early, defective formulations of the theory. The construction in its present form is entirely beyond the reach of criticisms on this plane. In its most developed form the postulation of rationality implies the following: (*a*) individuals have well-ordered preference systems; (*b*) each individual's preference system is substantially independent of the other economic variables; (*c*) each individual acts to maximise his utility index.

For Lionel Robbins the postulation of intrinsic rationality as the norm which relates means to ends has a firm empirical basis. The postulate itself is directly confirmed by introspection. If we were to raise the objection that introspection does not lead to propositions of public validity, it could indeed be argued that we could establish the postulate by subjecting it to intersubjective tests. According to Professor Duesenberry, for instance,

> "Our evidence on this question is not confined to introspection. Each of us is equipped with a body of observations on the behavior of other people which confirms the idea that everyone has a well-ordered preference system at every moment. Moreover, we can confirm our interpretation of overt behavior by discussing tastes and differences in tastes. There is enough information to confirm us in our belief that the concept of a preference field is a meaningful one. Thus the utility theory, in its modern form at any rate, is not a remnant of an out-moded psychological theory as some have maintained, but has an empirical basis." [3]

The only basis, in fact, for rejecting the postulate would consist in the discovery that human behaviour is (*a*) strictly or primarily random, (*b*) "irrational" in the sense that it is inconsistent, (*c*) instinctive, (*d*) strictly traditional. In so far as the presence of a "deliberative process" can be confirmed, the essence of the rationality or the maximisation postulate must be accepted.

[1] Talcott Parsons, *The Structure of Social Action*, Glencoe, Illinois, The Free Press, 1949, pp. 43–4.

[2] Intrinsic rationality may be contrasted to symbolic rationality. For an analysis of the concepts the reader is referred to Parsons, *op. cit.*, pp. 200–18.

[3] James S. Duesenberry, *Income Saving, and the Theory of Consumer Behaviour*, Cambridge, Harvard University Press, 1949, pp. 12–13.

The claim that Robbins's approach also leads to pure theory, however, rests on the grounds that no statements about empirical reality are derived (at least by Robbins) [1] from the postulate which could conceivably make a difference about reality, which, in other words, could conceivably be refuted. This very weakness of the theory from the point of view of empirical relevance has been praised by some as a unique contribution to the method of empirical science. Northrop, for instance, proclaims that

> "But if the method of obtaining publicly valid theory in contemporary economics has rendered the indirect experimental testing of that theory through its theorems impossible, it has also made it unnecessary. By restricting itself to the generic properties of the introspected valuations, *economics has accomplished something unique in the method of empirical science; it has attained deductively formulated theory which is empirically verified directly through its postulates without the need of appeal to their deductive consequences.*" [2]

Far from being a source of pride, this is considered a decisive shortcoming by the modern economist who aspires to make economics an empirical science in the sense of a theory which yields theorems which could conceivably make a difference. On these grounds we must decide that Robbins's method leads to pure theory and only pure theory.

It must be made clear, nevertheless, that this shortcoming is not inherent in the action framework of analysis. It has become abundantly clear that adept manipulation of the maximisation postulate (plus some other important modifications which will be discussed below) can turn the theory into a source of a number of operationally meaningful theorems. The recent contribution of Professor Samuelson in his *Foundations of Economic Analysis* is a case in point. According to Samuelson

> "It is hardly enough . . . to show that under certain conditions we can name enough relations (equations) to determine the values of our unknowns. It is important that our analysis be developed in such terms that we are aided in determining how our variables change qualitatively or quantitatively with changes in explicit data. Thus, we introduce explicitly into our system certain data in the form of parameters, which in changing cause shifts in our functional relations. The usefulness of our theory emerges from the fact that by our analysis we are often able to determine the nature of the changes in our unknown variables resulting from a designated change in one or more parameters. In fact, our

[1] All comments on Professor Robbins's position refer to his statements in his *Essay on the Nature and Significance of Economic Science.*

[2] F. S. C. Northrop, *op. cit.*, p. 247.

> theory is meaningless in the operational sense unless it does imply some restrictions upon empirically observable quantities, by which it could conceivably be refuted." [1]

Samuelson's procedure for arriving at operationally meaningful theorems takes us to the very heart of modern economic analysis. We first establish the fact that we are confronted with n equations in n variables and m parameters. Then we transform this system of equations into a system in which the variables are explicit functions of the parameters. Our final step preceding confirmation procedures involves utilisation of the maximum postulate to arrive, whenever this is feasible, at commitments concerning the signs of the rates of change of the variables with respect to the parameters. In so far as these propositions are refutable, even though this may be feasible only under ideal conditions, we have arrived at operationally meaningful hypotheses.[2]

It should be clear, of course, that another alternative is open to us. Along more strictly econometric lines we could proceed as follows. Employing the action framework along with the rational norm postulate we can arrive at a list of theoretically relevant variables. If we then proceed to choose the functional forms to be used, we can estimate the parameters by appropriate statistical techniques. This approach, whenever feasible, leads us to quantitative results, whereas the " signs " method is necessarily restricted to qualitative results so far as the variables appearing in the equations are concerned.

Closer inspection of the two procedures just discussed reveals the fundamental methodological property of modern economics. This property lies in what may be called the " back-room–front-room " approach. The " front-room " consists of a system of equations relating operationally defined economic variables. The " back-room " consists of a conceptual scheme which, though different from that of the " front-room," is designed to impose restrictions upon the form of the equations or the list of the relevant variables, depending on whether the " signs " or the " parameters " method is employed. Economists of the Robbins class have restricted their efforts to the " back-room," whereas empiricists–statisticians became absorbed with the " front-room."

[1] P. A. Samuelson, *op. cit.*, p. 7.

[2] This presentation differs significantly from Samuelson's in two respects: First, since this discussion has been restricted to comparative statics, Samuelson's second major source of operationally meaningful theorems, namely the stability postulate, has been ignored. Secondly, the rationality postulate in Samuelson takes the form of maximisation *or minimisation* of some magnitude, whereas in this paper reference is made only to maximisation. This is accounted for by the fact that the argument in this paper is restricted *so far* to the general problem of utility with respect to which the rational norm prescribes maximisation.

The growing consciousness of the intimate relationship between the two sectors of economic analysis is a sign that economics is on its way to maturity as a science.

We are now in a position to tackle our central problem, namely the problem of the relationship between economics and the social sciences. The principal claim of this paper is that integration must be sought in the formulation of the conceptual framework employed in the " back-room " of economics. The rest of this paper is devoted to the elaboration of this proposition.

We made the claim above that the introduction of the rationality postulate enables us to restrict the form of the relations among economic variables in such a fashion that operationally meaningful theorems may be formulated. This claim, however, exaggerates our accomplishments. If we restrict ourselves to the rationality postulate, if we make that assumption and that assumption alone, the results in terms of operationally meaningful theorems will be very puny indeed. Modern utility and consumer behavior theory is a case in point. The fundamental proposition that may be derived from the maximisation of the utility index postulate merely states that the demand functions are homogeneous of order zero in prices. Few economists would be satisfied with these results; fewer yet would consider this accomplishment adequate grounds for calling economics an empirical science. The paucity of the operationally meaningful theorems that can be deduced from the rationality postulate are due to its universality. In the words of James Duesenberry

> " The preference system analysis of consumer behaviour is a somewhat remarkable tour de force. It seems to say something about consumer behaviour without saying anything about the motivations of the consumers in question. In its present form it is a more or less deliberate attempt to sidestep the task of making psychological assumptions. It has the advantage that it allows one to avoid getting out on a psychological limb which may collapse at any moment." [1]

The very attempt of economic analysis to build a theory of universal validity, to avoid any and all psychological and sociological commitments takes it into the path of operational meaninglessness. The only way out of the impasse, the only way for arriving at an empirically relevant science is to make these commitments. This would reduce the universality of the propositions, but at the same time it would increase their range of meaningfulness. It can be seen now, however, that this can be accomplished only by utilising the findings of the other social sciences. The procedure calls, in

[1] J. S. Duesenberry, *op. cit.*, p. 15.

fact, for a careful inventorying of all the tentatively valid propositions of psychology, anthropology and sociology in an effort to equip economics with the tools necessary to impose restrictions upon the relations among economic variables in order that operationally meaningful hypotheses may be formulated. Duesenberry's *Income, Saving, and the Theory of Consumer Behaviour* is an outstanding performance in this frontier territory.

It is little known that Talcott Parsons as far back as the early thirties conceived the problem in almost exactly this form and formulated it most elegantly in his *Structure of Social Action*. Detailed reference to his work cannot be made here, in so far as his conceptual framework is so elaborate that any discussion of his propositions would take us far afield. The clear implication of Parsons's argument is that the ultimate ends, the value-system, of the society in which behaviour is studied must somehow find their place in the action framework employed in the analysis. It is not sufficient to postulate the rational norm. We must further make commitment to value-systems which are " ideally typical " in the culture under analysis. Duesenberry has attempted to do this with considerable success in the field of consumer behavior. The procedure should be extended, however, to other fields of behavior.

It is necessary at this point to turn our attention to the fact that most of the operationally meaningful theorems in economics are not derived from the postulate of utility index maximisation, but rather from the postulate of profit maximisation by the entrepreneur. It has been generally assumed (though by no means by all economists) that the profit maximisation assumption rests on the same universal grounds as the utility index maximisation assumption. Nothing could be farther from the truth. The assumption that entrepreneurs maximise profits involves us directly (though at times only implicitly) to a sociological commitment. It can be argued, of course, that since firms constitute the intermediate not the final sector of the economy, and that since money is in our society the universal means for accomplishing any ends whatsoever, profit maximisation is fully consistent and the maximisation of the utility indices in the final or the consumer sector of the economy. No doubt this is correct. Other " principles of selection," to use Professor Boulding's terminology, are conceivable, however, which are also consistent with utility index maximisation. This is especially the case when entrepreneurial activity is pursued for its own sake. It seems mandatory, therefore, that we do not consider profit maximisation as the exclusive principle of selection, but seek to discover what particular principles of selection are relevant in various situations.

The basic conclusions of this paper may now be stated in a somewhat more precise form. It is necessary, if we wish to develop operationally meaningful hypotheses, that in the " back-room " of economic analysis we proceed with the construction of a variety of " ideal types " [1] which commit us to a greater or lesser extent to tentatively valid psychological or sociological hypotheses.[2] This will enable us to increase significantly the number of operationally meaningful hypotheses in economics, albeit it will reduce the universality of our science. In general, we shall be able to work within the framework of action and the postulate of the rational norm. Our commitment in such cases will take the form of introducing " ideally typical " ultimate ends in our system. In other cases the action framework itself may break down. We may be obligated to recognise that behavior in these cases may be best described by a model postulating instinctive or strictly traditional behavior. In still other cases we may leave our " back-room " entirely empty. It is possible, for instance, to commit ourselves directly to an empirical generalisation which will take the form of a relation appearing only in the " front-room " of our analysis. The Keynesian supply of labor function is a case in point. In general, we should extricate ourselves from the shackles of economic universalism and experiment with less general but often more useful constructions.

The social sciences may be expected to contribute to economic analysis in other ways as well. The " institutions " prevalent in a culture will obviously reduce the number of elements of the situation confronting the actor which from his point of view are means rather than conditions. Institutional patterns may, in some cases, directly enter the " front-room " of economic analysis. Legal or institutional relations are often directly introduced in the system of equations of econometric models. The maxim that the economist of our day should observe is open-mindedness towards the achievements of the other social sciences. The future of economics as an empirical science may well depend on the degree to which our generation of economists are willing to live by it.

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[1] For a discussion of the " ideal type " the reader is referred to Talcott Parsons, *op. cit.*, pp. 601–10.

[2] It should be clear that other elements of the social structure beyond societal values could be introduced into the " back-room " of economic analysis. The most outstanding additional category which could be employed in this fashion by economists has to do with the " structure of power relations." Consideration of this issue, however, is beyond the scope of this paper.

MR. HARROD'S DYNAMIC MODEL

Postulates and Theorems.

In a famous essay [1] Mr. R. F. Harrod developed a very simple but apparently quite general model of a dynamic economic system. Within that model Mr. Harrod established two important theorems which were surprisingly specific in view of the generality of the three postulates which he advanced as the axiomatic basis of his theory:

> "(1) that the level of a community's income is the most important determinant of its supply of savings;
> "(2) that the rate of increase of its income is an important determinant of its demand for saving, and
> "(3) that demand is equal to supply." [2]

On the basis of these three postulates the following conclusions, which we may designate as theorems, were claimed to be proved:

> *Theorem* 1. There exists a rate of growth, G_w, of national income such that if that rate holds in a given period producers will maintain the same rate of growth of income in the following period if that is physically possible. "A unique warranted line of growth, $[G_w]$, is determined jointly by the propensity to save and the quantity of capital required by technological and other considerations per unit of increment of total output." [3]
>
> *Theorem* 2. "If the aggregated result by trial and error by numerous producers gives a value for G (the rate of growth actually realized in the period under consideration) which is different from G_w, there will not be any tendency to adapt production towards G_w, but, on the contrary, a tendency to adapt production still farther away from it, whether on the higher or lower side." [4]

G_w is called the warranted rate of growth. It is *defined* "as that over-all rate of advance which, if executed, will leave

[1] R. F. Harrod, "An Essay in Dynamic Theory," Economic Journal, Vol. XLIX (1939), pp. 14 *et seq.* The same trend of thought is presented with slight changes of notation in R. F. Harrod, *Towards A Dynamic Economics*, London, 1948. These will be referred to as *Essay* and *Towards* respectively. We shall here follow the notation of *Towards* except that the variables will be given subscripts to show to which time periods they refer.

[2] *Essay*, p. 14. [3] *Essay*, p. 14. [4] *Towards*, p. 87.

entrepreneurs in a state of mind in which they are prepared to carry on a similar advance." [1] Mr. Harrod assumes that except when an increase of production, and therefore of income, is limited by "fundamental conditions" such as the size of the population or known technology, entrepreneurs will do what they are prepared to do. We may then say that G_w is defined as that rate of increase of income which, if achieved, will be continued into the future by entrepreneurs so long as they can do so.

G_w depends entirely on the behaviour pattern of entrepreneurs. It is accordingly quite surprising that Harrod presents a proof not only that G_w always exists,[2] but also that it is equal to $\frac{s}{C_r}$, where s is the average propensity to save and C_r is the accelerator. That is, s is the ratio of saving to income in the period under consideration,[3] and C_r is "the value of the capital goods required for the production of a unit increment of output." [4]

Having defined G_w, it remains to be proved that it exists under any particular conditions. Whether or not G_w exists is a matter of fact; it is quite possible that there is no rate of growth of income such that it will leave entrepreneurs in the frame of mind to continue that rate of growth of production. Harrod's first proposition is that G_w, a characteristic of the behaviour of businessmen, exists and is equal to the ratio of two terms, one of which is a characteristic of the behaviour of savers, and the other is a technological characteristic of production.

Harrod assumes that the production of any period, up to the limitations imposed technologically, is determined by the decisions of entrepreneurs. Suppose that their decision as to how much to produce in any period is a linear function of income levels of the past n periods. There will not in general exist a real positive rate of growth G_w such that if it was sustained over the last n periods, it will then hold in the $(n + 1)$th period as well. For such a rate to exist, the coefficients of the function relating current to past incomes must satisfy certain conditions.[5]

Thus consider a dynamic model involving the interaction of

[1] *Towards*, p. 82.

[2] *Essay*, paragraphs 4 and 5.

[3] Harrod usually assumes that s is the ratio of the saving of the current period to the income of the previous period.

[4] *Essay*, p. 16. Harrod recognises elsewhere that C_r must be given a time dimension.

[5] See my article "The Accelerator as a Generator of Steady Growth," *Quarterly Journal of Economics*, Vol. LXIII, May 1949, for a discussion of these conditions.

the accelerator and propensity to consume of the sort discussed by Samuelson : [1]

$$Y_t = (1 - s)Y_{t-1} + C_r(Y_{t-1} - Y_{t-2}) \quad . \quad . \quad (1)$$

In this equation Y_t, as usual, represents income of period t, and s and C_r are the propensity to save and the accelerator as in Harrod's model. An equation of this form is usually interpreted as indicating that the income-determining expenditures of the tth period depend on the income and the change of income of the previous period; that is, that it takes one period for the expenditures related to a given income in the case of consumption, or a given change of income in the case of investment, to go through the economic system and once again become income. But we may if we like read equation (1) as giving the rule for the behaviour of entrepreneurs, that they will cause to be produced in period t an amount equal to the expenditure for consumption out of the income of the period $(t - 1)$ plus the amount of investment justified by the increase of income in period $(t - 1)$ over that of period $(t - 2)$.

Suppose that $s = 0{\cdot}1$ and $C_r = 1{\cdot}5$. Then equation (1) implies an explosive cyclical pattern and there is no steady rate of growth G_w, such that upon substitution of $Y_0 = 1$, $Y_1 = 1 + G_w$ in equation (1), the equation will yield $Y_t = (1 + G_w)^t$.[2] Whatever rate of growth, G, is tried in (1) by setting $Y_{t-1} = (1 + G)Y_{t-2}$, the resulting value of Y_t will be less than $(1 + G)Y_{t-1}$, so long as $(1 - s + C_r)^2 < 4C_r$.

How then does Harrod prove the proposition that G_w exists and that it is equal to $\frac{s}{C_r}$? He starts with an identity :

$$G_t \equiv \frac{s_t'}{C_t} \quad . \quad . \quad . \quad . \quad . \quad . \quad . \quad (2)$$

in which all the terms are measured *ex post*,[3] that is, G_t is the rate of growth that has actually occurred in period t, C_t is the ratio of increment of capital (net investment) to increment of income actually experienced, and s_t' is the ratio to income of

[1] Paul A. Samuelson, "Interactions between the Multiplier Analysis and the Principle of Acceleration," *Review of Economic Statistics*, Vol. XXI, No. 2, May 1939, pp. 75–8; reprinted in *Readings in Business Cycle Theory* (Blakiston), 1944.

[2] Proof: If this were so then $x = 1 + G_w$ would be a root of $x^2 - (1 - s)x - C_r(x - 1)$. But the roots of that polynomial are complex when $(1 - s + C_r)^2 < 4C_r$.

[3] Harrod's notation has been slightly modified in order to preserve the distinction between measurements *ex ante* and *ex post*.

the $(t-1)$th period of saving that has actually been made in period t.[1]

That (2) is an identity follows from the following definitions:

Definition 1. *ex post* saving $\equiv$ *ex post* investment so that

$$s_t' \cdot Y_{t-1} \equiv C_t(Y_t - Y_{t-1}) \quad . \quad . \quad . \quad . \quad (3)$$

Definition 2.

$$G_t \equiv \frac{Y_t - Y_{t-1}}{Y_{t-1}} \quad . \quad . \quad . \quad . \quad . \quad . \quad . \quad (4)$$

Dividing both sides of (3) by $C_t Y_{t-1}$ we get

$$\frac{s_t'}{C_t} \equiv \frac{Y_t - Y_{t-1}}{Y_{t-1}} \equiv G_t \quad . \quad . \quad . \quad . \quad . \quad (5)$$

Harrod assumes as a matter of fact that *ex post* saving equals *ex ante* saving so that $s_t' = s$. This assumption is a substitute for Postulate 3 for it tells what happens when demand for and supply of saving are not equal. From this assumption and (5) we get

$$G_t = \frac{s}{C_t} \quad . \quad . \quad . \quad . \quad . \quad . \quad . \quad . \quad (6)$$

Now comes the crucial step in the proof so let us have it in Harrod's exact words:

> "If the value of the increment of stock of capital per unit increment of output which actually occurs, C_t, is equal to C_r, the amount of capital per unit increment of output required by technological and other conditions . . . then clearly the increase which actually occurs is equal to the increase which is justified by the circumstances. This means that, since C_t includes all goods (circulating and fixed capital), and is in fact production minus consumption per unit increment of output during the period, the sum of decisions to produce, to which G_t gives expression, are on balance justified—*i.e.*, if $C_r = C_t$ then $G_t = G_w$ and (from (6) above) $G_w = \frac{s}{C_r}$."[2]

The first statement that if $C_t = C_r$ the investment was justified may be regarded as a definition of the term justified. The second statement is also definitional, that if the investment actually made is the amount that is justified, then the total amount of goods produced will have been justified.

So far the argument is merely definitional. The critical question is why does $C_r = C_t$ imply $G_t = G_w$? That means that

[1] Note the peculiar timing that relates saving in period t to the income of the previous period. In this I follow Harrod (*Essay*, p. 18). Later we shall consider the effect of changing this assumption as to timing.

[2] *Essay*, p. 18. Subscript notation changed from original.

if the decisions to increase output from last period to this one were justified, new decisions will be made to continue the same percentage rate of growth into the next period. This need not be so, and it is an important characteristic of Mr. Harrod's model that he assumes that it is so.

Let us temporarily assume that it is not so, that the behaviour of entrepreneurs is such that if this year's production decisions are justified (giving to that term the meaning Mr. Harrod attaches to it) next year's production will equal this year's production. Under this assumption if G_t is a justified rate of growth not equal to zero, then G_t cannot be a warranted rate of growth since by our temporary assumption, if G_t is justified, $G_{t+1} = 0$ and for G_t to be a warranted rate of growth it must, by definition, be followed by $G_{t+1} = G_t$. Our temporary assumption of entrepreneurial behaviour accordingly contradicts Mr. Harrod's proof.

Therefore, the postulate, that if G_t is justified $G_{t+1} = G_t$, is essential for Mr. Harrod's proof. This postulate is much more restricted than the general postulates advanced by Harrod, and helps explain how Mr. Harrod got such specific conclusions from such general postulates. In fact, Mr. Harrod did not use his general postulates at all, but implicitly substituted for them the following set of more highly restricted postulates :

Postulate 1*a*. ***Ex ante*** saving in period $t = sY_{t-1}$.

Postulate 2*a*. The justified investment in period $t = C_r(Y_t - Y_{t-1})$.

Postulate 3*a*. ***Ex post*** investment = ***ex ante*** saving.[1]

Postulate 3*b*. If investment ***ex post*** is justified in any period, entrepreneurs will (unless prevented by physical limitations) in the succeeding period increase production in the same proportion as it has just been increased. If in any period investment ***ex post*** is less than the justified investment, entrepreneurs will in the next period increase the rate of growth of production, and vice versa.

Let us denote the difference between justified investment and ***ex post*** investment in the tth period as U_t. Then by Postulates 1*a*, 2*a* and 3*a* :

$$U_t = C_r(Y_t - Y_{t-1}) - sY_{t-1} \quad . \quad . \quad . \quad . \quad (7)$$

Postulate 3*b* can then be expressed as

$$G_{t+1} = G_t + F(U_t) \quad . \quad . \quad . \quad . \quad . \quad (8)$$

[1] As noted below, this is not a necessary assumption for Mr. Harrod's model, but it was adopted for simplicity of exposition.

where F is any function which is positive, negative or zero according to whether U_t is positive, negative or zero. From this definition of F it follows from (8) that $G_{t+1} = G_t$ when and only when $U_t = 0$, and $U_t = 0$ is then a necessary and sufficient condition for a warranted rate of growth, a rate such that if realised in period t, it will again be realised in period $t + 1$.

Mr. Harrod's first theorem can be immediately demonstrated by noting that $Y_t = Y_0\left(1 + \frac{s}{C_r}\right)^t$ upon substitution in (7) yields $U_t = 0$. Therefore if Postulates 1*a*, 2*a*, 3*a* and 3*b* hold there does exist a warranted rate of growth $G_w = \frac{s}{C_r}$.

Mr. Harrod's second or instability theorem, states that if $G_t \neq \frac{s}{C_r}$, then G_{t+1} will be farther from $\frac{s}{C_r}$ than was G_t.[1] Suppose $G_t = \frac{s}{C_r} + b$; then by definition (2) $Y_t = \left(1 + \frac{s}{C_r} + b\right) Y_{t-1}$, and from (7) it may be seen that $U_t = bC_rY_{t-1}$. If as we usually assume C_r and Y_{t-1} are positive, U_t will have the same sign as b. By Postulate 3*b*, $F(U_t)$ has the same sign as U_t. Then by (8), G_{t+1} will be greater or less than G_t if b is greater or less than zero respectively. Therefore if G_t differs from $\frac{s}{C_r}$, G_{t+1} will differ more, so that successive G's will depart farther and farther from $\frac{s}{C_r}$.

Although Postulates 1*a*, 2*a*, 3*a* and 3*b* completely specify Mr. Harrod's model, except for the exact shape of $F(U_t)$, a more general set of postulates might have specified the same dynamic system. As Mr. Harrod has observed,[2] his particular assumption that *ex ante* savings = *ex post* savings is not essential to his system. We may accordingly make Mr. Harrod's system somewhat more general by substituting the concept of *ex ante* investment for that of justified investment.

Leaving Postulate 1*a* unchanged we may form the extended Harrod model by substituting the following two postulates for Postulates 2*a*, 3*a* and 3*b*.

[1] A dynamic system is frequently said to be unstable when it does not approach a limiting value as time goes on. From this point of view continued growth, however steady, is unstable. But in the present analysis we may define a different concept of instability which we may call instability in the Harrod sense. Given a warranted rate of growth G_w, if over a certain range of G_t when $G_t \neq G_w$, then $|G_{t+1} - G_w| > |G_t - G_w|$, the growth rate is unstable in the Harrod sense over the specified range of G_t.

[2] *Essay*, p. 21.

Extended Postulate 2*b*. *Ex ante* investment in period $t = C_r(Y_t - Y_{t-1})$.

Extended Postulate 3*c*. If investment *ex ante* = saving *ex ante* in period t, the rate of growth of income in period $t + 1$ will equal the rate of growth in period t. If *ex ante* investment exceeds *ex ante* saving in period t, the rate of growth of income in period $t + 1$ will be larger than that of period t, and vice versa.

Postulates 1*a*, 2*b* and 3*c* lead to exactly the same dynamic model as did Postulates 1*a*, 2*a*, 3*a* and 3*b*, provided U_t is redefined to be the difference between *ex ante* investment and *ex ante* saving, instead of the difference between justified investment and *ex post* investment. The two sets of postulates lead to identical behaviour of Y_t from any given initial conditions. The only difference between them relates to the intermediate mechanism which brings this behaviour about.

Mr. Harrod discusses his model almost exclusively in terms of *ex post* saving equalling *ex ante* saving, so that some who disagree on this point might have been tempted to reject Harrod's model. Mr. W. J. Baumol, in comparing the Harrod with the Samuelson model has indicated that one of the principal differences was that in Harrod's system *ex post* saving-investment = *ex ante* saving, while in a Samuelson system *ex post* saving-investment = *ex ante* investment.[1] Since the extended Harrod postulates fit exactly the same dynamic system as do the postulates actually used by Harrod we must disagree. Mr. Harrod's system is more general than the restricted assumption of *ex post* investment equalling *ex ante* saving.

None the less, the Harrod model is based on restricted assumptions much less general than the postulates originally listed (p. 724 above). What happens to Mr. Harrod's theorems if we consider postulates more general than 3*c*?

In order to make Postulate 3*c* more general we may take a hint from Mr. Harrod's observation concerning the similarity of his model to Mr. Keynes's proposition in the Treatise that if investment exceeded saving the system would be stimulated to expand and conversely.[2] An excess of *ex ante* investment over *ex ante* saving leads to an increase in income because expenditure will then exceed income. Therefore the following may be considered as a generalised form of Postulates 3*b* or 3*c*.

[1] W. J. Baumol, "Notes on Some Dynamic Models," ECONOMIC JOURNAL, LVIII (232), December 1948, p. 514.

[2] *Essay*, p. 19.

Postulate 3*d*. If in the current period expenditure exceeds income produced, the rate of growth of income produced in the next period will exceed that of the current period. If expenditure is less than income produced, the rate of growth of income produced in the next period will be less than that of the current period.

In equation form this postulate leads to exactly the same dynamic model as that expressed by (8) except that now

$$U_t = E_t - Y_t \quad . \quad . \quad . \quad . \quad . \quad . \quad . \quad (9)$$

where E_t represents expenditure in period t. The other terms are as previously defined.

We may call (8) and (9) the generalised Harrod model.

The behaviour of the generalised Harrod model depends on the specific assumptions that are made concerning the dependence of expenditure in period t on the income of the current and previous periods. Mr. Harrod's own model is a particular case of the generalised Harrod model in which Postulates 1*a*, 2*a* or 2*b* specify the way in which expenditure depends on income of the current and preceding period, as expressed by (7) in conjunction with (9):

$$E_t = Y_t - sY_{t-1} + C_r(Y_t - Y_{t-1}) \quad . \quad . \quad . \quad (10)$$

Equation (10) furnishes a clue to the instability of Harrod's original system. For it says that a 1-unit increase in a period's income brings about a $(1 + C_r)$-unit increase in that period's expenditure. If in Harrod's original model a 1-unit increase of income in period t leads to more than a 1-unit increase in expenditure, why is not the model immediately unstable in period t? The relevant question now appears to be not why the Harrod model is eventually unstable, but why it is not immediately unstable. The answer lies in the assumption that Harrod has implicitly made that expenditure of period t does not affect income of period t. It does determine the rate of growth of income in the next period however. Harrod has assumed that the current period's income depends on entrepreneurial decisions based on the relation of expenditure to production in the preceding period. Therefore an increment of income of this period which leads to an even larger increment in expenditure in this period will raise the income of next period, and the expenditure of next period which will raise the income of the succeeding period, etc.

Sometimes Mr. Harrod considers the possibility that s may vary and so become large enough to stabilise his model, though only to dismiss this possibility because of the large marginal rate

of saving required. But no matter how large s is it cannot stabilise the system described by equations (7) and (8), since the size of s did not enter into the proof of Theorem 2 that the system is unstable.

How then can Harrod take the view that a sufficiently large s can stabilise his system? That view implies a different timing of the relationship between saving and income than is required for the proof of Harrod's two theorems, but Mr. Harrod is not entirely consistent in his assumptions as to the timing of saving. Sometimes he implies that *ex ante* saving of period t equals sY_t rather than sY_{t-1}.[1] Under that assumption, if the marginal rate of saving is greater than C_r, the growth of Y_t can be stabilised in the Harrod sense, provided the average rate of saving is less than C_r.

A Samuelson Model.

We may contrast the generalised Harrod model of equations (8) and (9) with what we may call a generalised Samuelson model. That model is based on the assumption that income of any period equals expenditure in that period, so the generalised Samuelson model is

$$Y_t = E_t \quad . \quad . \quad . \quad . \quad . \quad . \quad . \quad (12)$$

This model is a substitute for Postulates 3*a*, 3*b* or 3*c* of Harrod's system. It says essentially that income is equal to expenditure rather than that income is determined by entrepreneurial decisions based on the behaviour of expenditure. We can easily appraise the behaviour indicated by a Samuelson model under Harrod's Postulates 1*a* and 2*b* as expressed in equation (10). Combining equations (10) and (12) we get :

$$Y_t = E_t \equiv Y_t - sY_{t-1} + C_r(Y_t - Y_{t-1}) \quad . \quad . \quad (13)$$

This equation has the solution

$$Y_t = Y_0\left(1 + \frac{s}{C_r}\right)^t \quad . \quad . \quad . \quad . \quad . \quad (14)$$

that is $G_w = \frac{s}{C_r}$ exactly as in the Harrod model. Furthermore, as in the Harrod model this solution is unstable since in (13) a 1-unit increase in income on the right-hand side will bring about a $1 + C_r$-unit increase of expenditure and therefore of income in the same period, which will bring about a $(1 + C_r)^2$-unit increase

[1] This inconsistency was pointed out by Baumol, *op. cit.*, p. 507, footnote 1. If saving equals sY_t rather than sY_{t-1}, the warranted rate of growth G_w is $\frac{s}{C_r - s}$ rather than $\frac{s}{C_r}$.

of expenditure and income in the same period and so on *ad infinitum*. Given Harrod's assumption as to the timing of investment and saving, the Samuelson model yields exactly the same results as does the Harrod model, except that the system will immediately explode in the Samuelson model, while income in the Harrod model will grow at a finite but ever-increasing rate.

The instability in this case is induced by the dependence of investment on income of the same period.[1] If it is then assumed that investment expenditure of period t depends on the change of income of previous periods the explosive process which in the previous case was compressed within a single period will now operate only gradually from period to period.

Thus suppose we change Harrod's assumption expressed in Postulates 2*a* or 2*b* to :

Postulate 2*c*. ***Ex ante*** investment of period $t = C_r(Y_{t-1} - Y_{t-2})$.

This differs from Postulates 2*a* or 2*b* only in that the investment effect of a change in income is lagged one period. Then

$$U_t = C_r(Y_{t-1} - Y_{t-2}) - Y_t + (1 - s)Y_{t-1} \quad . \quad . \quad (15)$$

If we substitute (15) in the general Harrod model (9) we find that there will be a warranted rate of growth only if $(C_r + 1 - s)^2 > 4C_r$. If that condition is fulfilled there will be two such rates of growth G_{w1} and G_{w2}.[2] The smaller of these will be unstable, and the larger will be stable in the Harrod sense.

Insertion of Postulate 2*c* into the Samuelson model yields similar behaviour. There is no warranted rate of growth unless $(C_r + 1 - s)^2 > 4C_r$. If that condition is fulfilled, then the same two rates of growth G_{w1} and G_{w2} that were warranted rates in the Harrod model will be components of the solution in the Samuelson model.

The similarity between the Harrod model and the Samuelson model is no coincidence. It follows from the fundamental construction of the two models. The Harrod model says that when expenditure equals income the rate of growth is continued, *i.e.*,

[1] This has been pointed out by J. R. Hicks, " Mr. Harrod's Dynamic Theory," *Economica*, (N.S.) XVI (62), May 1949, p. 210.

[2] $G_{w1} = \dfrac{C_r + 1 - s - \sqrt{(C_r + 1 - s)^2 - 4C_r}}{2} - 1$

and $G_{w2} = \dfrac{C_r + 1 - s + \sqrt{C_r + 1 - s)^2 - 4C_r}}{2} - 1$

Note that $C_r \geqslant 4$ and $s \leqslant 1$ are sufficient, but not necessary conditions for the existence of a warranted rate of growth.

it is a warranted rate of growth. The Samuelson model simply says that income equals expenditure. But when income equals expenditure then according to Mr. Harrod's definitions and postulates the rate of growth has been justified; so what the Samuelson model says will happen the Harrod model considers as a normal development from which deviations occur. If there is a steady rate of growth that satisfies the Samuelson model it will be a warranted rate of growth in the Harrod model. If a given rate of growth is unstable in one, then it is unstable in the other. If the Samuelson model can be satisfied only by oscillating movements the same will in general be true of the Harrod model.

This similarity makes further investigation of the generalised Harrod model much easier, since we can perform our analysis on the simpler Samuelson model and carry the results over to Mr. Harrod's system.[1] The author has previously investigated the conditions under which steady growth is possible in a Samuelson model.[2] From that analysis it may be concluded that although Harrod's two theorems do depend upon the particular assumption he made about the timing of saving and investment, substantially the same theorems may be proved in the general case of current expenditures depending on past levels of income, but with some qualifications concerning the size and timing of propensity and accelerator.

In order to illustrate the manner in which the timing and size of propensity and accelerator influence the time shape of income as indicated by a Samuelson or Harrod model we may consider the following generalised system.

Suppose there are two types of expenditure in the system which we may call consumption and investment, respectively, although we are much more interested in the manner in which the two types depend on the levels of past and current income than in the objects of expenditure.

Postulate I. Consumption expenditure of time period $t = aY_{t-p}$.

Postulate II. Investment expenditure of period $t =$

$$c(Y_{t-p} - Y_{t-p-1}) + c(Y_{t-p-1} - Y_{t-p-2} + \ldots . + c(Y_{t-p-q+1} - Y_{t-p-q}).$$

[1] This is essentially what Mr. Hicks has done, *op. cit.* Unfortunately Mr. Hicks assumed a highly restrictive condition on the accelerator to get the minimum rate of steady growth (p. 113). Consequently, his system is not unstable in the Harrod sense.

[2] See footnote 5, p. 725.

Postulate III. A. Samuelson model:

$$Y_t = E_t \quad . \quad . \quad . \quad . \quad . \quad . \quad . \quad (12)$$

B. Harrod model:

$$G_{t+1} = G_t + F(E_t - Y_t) \quad . \quad . \quad . \quad (16)$$

(all terms as previously defined).

In these relationships we may call a the propensity to consume and c the current accelerator, p the consumption period and q the investment period. The adjoining Y's in Postulate II cancel out so that Postulate II can be written:

Investment expenditure of period $t = c(Y_{t-p} - Y_{t-p-q})$.

For these postulates of which Harrod's postulates can be considered a special limiting case with $p = 0$, we may state the following as the closest we can get to Harrod's theorems:

Generalised Theorem I. A warranted rate of growth, G_w, exists if and only if

$$\frac{q}{p+q}(a+c) > 1 \quad . \quad . \quad . \quad . \quad . \quad . \quad (17)$$

and

$$\frac{qc}{p} \leqslant \left[\frac{q}{p+q}(a+c)\right]^{\frac{p+q}{p}} \quad . \quad . \quad . \quad (18)$$

Generalised Theorem II. If one warranted rate of growth exists, another one also exists. The larger of the two, $\overline{G}$, which may be called the dominant rate of growth, must satisfy the condition

$$(1+\overline{G})^{p+q} \geqslant \frac{qc}{p} \quad . \quad . \quad . \quad . \quad (19)$$

The smaller (minor) rate of growth will be unstable, and the dominant rate stable in the Harrod sense.[1]

Notice that for a given a and c such that $a + c > 1$ and for given q we can, by choosing p sufficiently small, make sure that conditions (17) and (18) will be fulfilled. Harrod assumed essentially that $p = 0$ and (usually) that $a + c > 1$. Under these assumptions Harrod was sure to find steady growth possible in his system. Furthermore, as condition (19) indicates, as p gets smaller the dominant growth factor over the income plus investment period gets larger, and as p approaches 0, $\overline{G}$ increases without limit. But for $\overline{G}$ to increase without limit corresponds to Theorem 2. Therefore under Harrod's assumptions of $p = 0$ and $a + c > 1$ his two theorems are valid.

[1] See reference of footnote 5, p. 725 for proof of these theorems.

Under more general assumptions as to the size of p and $a + c$ Harrod's theorems must be qualified. The necessary qualifications are indicated by (17) and (18). We may define C_r as the *ultimate* accelerator, the amount of additional capital required for each additional unit of production per unit of time. Of course C_r has a time dimension such that C_r for a year is 1/12 of C_r for a month and 1/52 of C_r for a week. In contrast to the ultimate accelerator C_r, is c, the current accelerator. If q is the length of the investment period then $qc = C_r$.

The interaction of propensity and accelerator and their respective timing can be related to Harrod's first theorem as follows :

> For given non-zero values of C_r, p and q, a warranted rate of growth will exist, provided a is large enough.
>
> For given non-zero values of p, q and a, a warranted rate of growth will exist, provided C_r is large enough.
>
> For given non-zero values of p, a and C_r, a warranted rate of growth will exist, provided q is short enough, and $\frac{C_r}{p} > e$, the base of natural logarithms.
>
> For given non-zero values of a, C_r and q, a warranted rate of growth will exist, provided p is short enough and $a + \frac{C_r}{q} > 1$.

The above qualifications of Mr. Harrod's Theorem 1 are important principally if the propensity to consume or the ultimate accelerator is small, or if investment is a long time being put into place relative to the income period. For example, if it should take about five years for investment to be put into place, and C_r, the ultimate accelerator on an annual basis is of the magnitude of 2, and if $a < 0{\cdot}60$ then steady growth is impossible however short the income period, for $c < 0{\cdot}40$ and therefore $a + c < 1$. It is important to note that the relevant investment period is not a decision or use period, but the length of time it takes to make the expenditures for investment induced by a given period's increase in income.

If a warranted rate of growth exists, Harrod's second theorem is substantially true for all practical purposes. Harrod found that any departure from a warranted rate of growth leads to a greater subsequent departure. We find that this is true of a minor rate of growth but not for a dominant rate of growth. But for any realistic values of the relevant constants the dominant rate of growth, when steady growth is at all possible, will be so large that for any moderate initial rate of growth the rate of

growth is unstable in the Harrod sense unless stabilised by some factor not yet considered. The most promising candidate for the role of stabiliser is price.

Price as Stabiliser.

In both the Harrod and Samuelson models when rates of growth increase from a given initial rate they do so because the combined consumption and investment expenditure in each period exceeds the income produced in that or in the preceding period. But suppose increasing expenditure tends to raise prices as well as to call forth greater production. When prices rise a given increase of expenditure brings out less than a proportional increase in production. There will then be required a correspondingly smaller amount of new investment. As a result increasing prices may halt a runaway movement in the rate of growth of income and stabilise it at a moderate rate of growth, or even cause income to oscillate cyclically instead of growing steadily.[1] The remarkable feature of price as a stabiliser is that a relatively small degree of price flexibility may be sufficient to stabilise a highly explosive situation.

The manner in which price flexibility can stabilise an otherwise explosive situation can be illustrated by a simple example. Suppose there is no tendency to save whatsoever, the propensity to consume being equal to unity. Further suppose that $C_r = 2$, and the consumption and investment periods are each equal to one time unit. We may assume that the accelerator operates only on changes in real income, so that accelerator-induced real-investment expenditure of period t is :

$$C_r\left(\frac{Y_{t-1}}{p_{t-1}} - \frac{Y_{t-2}}{p_{t-2}}\right)$$

where p_t is the price level of period t. We also assume that this real expenditure is to be translated into money expenditure at prices of period $t-1$ so that money expenditure of period t is given by :

$$E_t = Y_{t-1} + 2\left(\frac{Y_{t-1}}{p_{t-1}} - \frac{Y_{t-2}}{p_{t-2}}\right)p_{t-1} \quad . \quad . \quad . \quad (20)$$

If prices are constant, then (20) implies, in a Samuelson or Harrod model, two warranted rates of growth $G_{w1} = 0$ and $G_{w2} = 100\%$. Any initial rate of growth of real income less than 100% per year will then lead to subsequent rates of growth larger

[1] See reference of footnote 5, p. 725, pp. 188 *et seq.* for a discussion of price flexibility as a stabiliser.

than the initial rate, *i.e.*, the model is unstable in the Harrod sense over initial growth rates of real income between 0 and 100%.

If prices are not constant, however, the situation is altered. Suppose, for example, that prices respond to an increase of expenditure in the following manner. An increase of expenditure will call forth increases in prices and in real output equal to each other. Thus a 21% increase in expenditure will call forth a 10% increase in real income and a 10% increase in the price level ($1{\cdot}10 \times 1{\cdot}10 = 1{\cdot}21$). Under these conditions (20) will be stable in the Harrod sense. Any initial rate of increase in real income will lead to smaller subsequent rates of increase. Thus a system that is highly unstable if prices are constant becomes stable in the Harrod sense when prices vary.

Let us see what makes the difference between the two cases. Suppose as initial conditions in both cases a 2% growth in real income. With constant prices in (20) if $Y_{t-2} = 0{\cdot}9804$, and $Y_{t-1} = 1{\cdot}00$, then $E_t = 1{\cdot}0392$. The Samuelson model, (12), indicates that $Y_t = 1{\cdot}0392$, so that the initial rate of 2% leads to an immediately following rate of about 4%. In the Harrod model (8), if $Y_t = 1{\cdot}02$, we see from (9) that $U_t > 0$ so that $G_{t+1} > G_t$. Therefore we know that the initial rate of 2 % will lead to a subsequent rate greater than 2%.

Under the second assumption, that price varies with real income, we may assume as the corresponding initial conditions: $\frac{Y_{t-2}}{p_{t-2}} = 0{\cdot}9804$, $\frac{Y_{t-1}}{p_{t-1}} = 1{\cdot}00$, $p_{t-1} = 1{\cdot}00$, so that (20) yields $E_t = 1{\cdot}0392$ just as in the previous case, but this increase of expenditure of 3·92% will, according to the assumption on price behaviour, imply a price rise of 1·94% and a rise of real income of 1·94%. The initial 2% rise of real income has not been sustained. If then we repeat the procedure using any other initial rate of growth we will find that the subsequent growth of money expenditure in this model when prices change as assumed must be less than twice the initial rate of growth of real income, and when the growth of money expenditure is broken down into an equal price rise and real-income rise, the rise of real income will be smaller than the initial rise. If we tried for example a 10% initial increase of real income and price in (20) it would lead to an 18·2% increase in money expenditure, which in turn would bring about only an 8·7% increase in real income and a 8·7% rise in prices. Thus (20) in conjunction with (12) leads, under the price behaviour assumed, to a sequence of incomes such that each period's rate of

growth is smaller than the preceding period's, so that the rate of growth tends towards 0.

So long then as present expenditures are based on past prices, a price rise can stabilise a rate of growth that might otherwise have led to even greater rates of growth. The familiar phenomenon of forced savings arises, buyers get less for their money than they intended to buy. If, however, the buyers refuse to be frustrated, but raise their expenditures in proportion to the rise of prices then prices cannot act as a stabiliser. If the money supply permits such behaviour there will ensue an inflationary process whose speed will be governed by the rapidity at which the spenders readjust to the new price level.

We may conclude that Mr. Harrod's theorems yield valuable insights into certain unstable relationships that can exist in an economy in which some expenditures depend on the rate of change of income. But whether a warranted rate of growth exists or not depends on the timing and magnitude of the various types of expenditure, and on the behaviour of prices. Similarly, although it seems reasonable to believe that timing and magnitude of the expenditures are such that a moderate warranted rate of growth would not be stable in the Harrod sense, yet that instability may be moderated by price flexibility if purchasers cannot or do not immediately increase their expenditures in proportion to a rise in the price level.

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SOME OBSERVATIONS ON PROBLEMS OF HILL AND MARGINAL LAND

ATTENTION has recently focused, both in Parliamentary debate and in Press discussion, on the problem of a fuller use of the hill and marginal land in this country. Such discussion usually leaves a vague impression that given goodwill, rather more effort and some minor adjustments in agricultural policy, these areas could become a large potential source of increased livestock production. Beef herds are usually mentioned, with the inference, undoubtedly true, that such an increase would serve to lighten the austerity of post-war food conditions, and contribute substantial encouragement to the precarious balance of food supplies in Europe.

This marginal problem in its entirety has been comparatively little analysed in full detail, though its importance has received much lip service.

At the root of the problem, capital and its nature, especially the peculiarities attached to agricultural capital, provide the real key to the fundamental difficulty inherent in this type of land. So closely are ecological considerations bound up with the examination and findings of the capital problem that it is difficult to say where, if at all, precise boundary lines occur between the geographical disability and economic opportunity with which the problem is so closely bound up.

Hill and marginal land comprises some 34% of the agricultural land of this country, the areas concerned providing a surprising similarity of underlying economic feature.

1. *Hill and marginal land is invariably an area of low rateable value per head.* The disability that this factor brings is one of the most noticeable social features of such areas. Disability may include inadequate or non-existent main drainage, sewage or water supplies; out-of-date and insufficient housing; old-fashioned social amenities; ill-balanced educational facilities of all types; lack of good transport services—and often lack of suitable roads to admit them—and like disadvantages.

It is an attempted remedy of these factors to which grants for marginal land improvement—distinct from producer subsidy such as hill sheep and cattle subsidy made to hill farms pursuing a definite sheep policy—subscribe. Far too often marginal

grants are confused with or represented as grants to the agricultural industry as such. In point of fact they more often invade the province of local government authority, often itself contending in inadequate resource with the angular problem that low rateable value propounds, rather than agricultural provinces more precisely defined.

Owing partly to the above factors, and to others more widely social in its strict sense, marginal areas tend to a drift of population of all ages and skills towards more favoured places. In villages and the small country towns population of a retired age group tends to replace them numerically and less skilfully. This replacement population reflects both the availability of houses or lack of them in other more crowded parts and an increasing demand for relief from congested urban places at retirement.

This replacement population is able and willing to offer capital investment in housing that tends to create artificial values in this repect, operating against local competition. Infiltration of skilled ancillary trades inseparable from agriculture into the area is thereby lessened. Skilled craftsman infiltration in any trade is in any case becoming very rare. A degree of instability tends to be present in such areas which does not in point of fact occur in industrial urban areas as distinct from residential ones.

2. *Hill and marginal areas are places of economic paradox.* Many indispensable services cost more—road mileage, for instance, with its small but definite effect on retail prices. Service facilities, from those enterprises engaged by domestic consumers to wholesale provision, such as bulk fuel, repair of agricultural implements and facilities provided for rural businesses, are others. Such servicing firms rightly add, directly or indirectly, travelling time and higher incidental costs to their customers' accounts. Further, extra wages or incentives are often paid to operatives and fitters capable of the higher skills, whose employment away from urban centres necessitates additional payment. Conversely, the loss in many ways occasioned by lack of such skills, or the cost of long and expensive haulage to urban centres providing them, is a little assessed additional item in the progressive hill and marginal land farmers' cost of production. Thought will provide many more examples of this peculiar costing feature characteristic of such areas.

Geographically and climatically such areas possess less earning power, a factor more pronounced for the farmer than for other occupations with less at stake under short-seasoned skies

and belated springs, but present, nevertheless, for all occupations in the areas concerned. In some trades and professions, of which butchering, general medical practice, trades catering for seasonal requirements—catering establishments, craft businesses and the like—are obvious examples, the decreased earning capacity in these areas, compared with more favoured ones, has a statistical basis, *i.e.*, low density of population, less incidence of specific demand, less proportionate use for specialised skills or expensive equipment, on which degrees of profitability ultimately depend. Conversely, the lack of such provision may adversely affect the amenities of such areas for potential earning power. Within the range of occupations and professions concerned, stocks of trade and occupational commodities, spares, replacements and incidentals, are required equal to areas of greater statistical earning power, and occasionally to insure against severe weather conditions, delay in supplies, and to benefit from discount and other rates related to quantity supply, larger stocks have to be held than might be considered usual. The unit size of these occupations may conceal the operation of this factor, but an estimation of work output per man hour against deadstock investment will often provide a mental jerk on this point. In addition, the quality of such accessories, especially those destined for outside use, must be relatively more durable than those for more favoured places, or, conversely, the depreciation rate is often higher in practice, with a shorter working life on lower potential output. This factor involves a higher cost consideration, which should not be ignored.

Present in such areas are modern discrepancies, small perhaps in themselves, which collectively contribute towards that "lessened resource" which is the underlying distinction of the marginal problem. In such areas, for instance, a tendency towards seasonal profits, and a tradition for the seasonal payment and collection of monies of various kinds, which assorts ill with the prevailing tendency for weekly payments, whether of retail accounts, fashionable hire purchase amongst wage-earners or payment for National Health Insurance premiums. Such matters, even in the field of the small items which they cover, have an appreciable bearing on liquid-cash requirements, money estimations and returns of all kinds. They play a definite part in the overall effect.

3. *Hill and marginal lands are areas of unpredictable requirements.* It is here that the hill and marginal farmers meet the full impact of their problems. No amount of foresight or skill,

for instance, can prevent the need for purchased fodder after periods of unseasonable weather. Drought, snow, rainfall, frosts—all have occasional local and immediate disaster values for all farmers, but to hill and marginal farmers with less resources risk is proportionately greater. Individual foresight directed against such contingencies, rather than use of the easier method of " experienced gamble," may well super-impose a trying cost in itself. Modern practices such as leys and long-term re-seeding, provide a partial answer. Such provisions not only incur high installation costs but also fail to evade practical economic repercussions. Prof. Ashby's assertion, for example, which can find support from practical experience, that the cost of substantial establishment of leys can be recovered only by liquid milk sales is certainly one to be borne in mind when other systems of farming, with other capital requirement corollaries, are considered. In alternative systems to that of dairying, re-seeding and ley farming are often professed keystones, and economic findings supported by practical experience, such as Prof. Ashby demonstrates in the case of re-seeding, should not and must not be ignored when extension of the use of hill and marginal land is under consideration.

4. *Farmers in marginal areas are denied access to the cash-crop facility available in more favoured areas.*

Cash crops, where they can be grown, can be varied to suit the cash needs of the unit, as they vary from year to year. Cash cropping in more favoured areas has a lower cost of production compared with the parallel stock investment, and its lower rate of cash realisation in marginal areas.

In hill and marginal areas it is therefore not surprising that financial improvisation, especially in the farming systems classically practised, has reached a high degree of skill amongst those whom time and the tests of time have left intact as productive units. These improvisations—substitutions as we have seen for the cash cropping of other areas—prevail as part of the occupational make-up of the individual. The term " marginal farmer " has recently been used as one of mild disfavour, whereas it is indicative of a financial acumen and flexibility in the niceties of profit margins which is not only unparalleled, but also largely unrecognised. That its prowess is financial rather than agricultural is a recognised factor of occupational survival in such areas. Whether or not this feature contributes to the most desirable farming system from a national standpoint in such areas is a debating point of some interest. It is difficult to see what

other short-term improvisation can be adopted which will be sufficiently flexible to withstand incidental changes. Short-sighted a national policy must be which does not admit a reasonable prosperity for such areas, avoiding the constant anxiety which the pressure of factors over which the individual has little or no control must bring. For this improvisation "in-and-out" farming is the term most economists employ, though the distinction "trade farming" and "commodity farming" may be preferred to denote alternative systems. In days which rightly demand attested stock, and attach the highest prices and returns to pedigree work, it is probable that this improvisation factor has met with a rebuff which would become even more apparent should the hill-farming structure proper require re-assembly after subsidy removal. The marginal structure has already been required to meet this point, reflected as it is in the present relatively lower profitability of marginal farming over other types. Local auction markets themselves react to local conditions, and thereby remove a resource which might be used to counter local disabilities, such as weather losses, unprecedented and unprofitable fodder purchases, etc. No guaranteed price, nationally provided, touches this point. Moreover, the higher value of specialised product also invariably incurs a higher initial outlay, to which cattle are no exception. The introduction of a self-replacement system into a herd previously maintained as a flying herd, or a sale and replacement in a herd of a higher grade of cattle, or an alternative breed, are all indications of the close relation between capital requirement and income level which prevails in the farming industry. Low-priced establishment of herds of any breed is all too often productive of unreliable stock; in the cattle world this means loss at some point.

The risks and disabilities of speculative dealing as a means of livelihood are too self-evident to merit more than passing attention. It is sufficient to say that they serve a purpose in the farmers' world, but their function and services should be considered as an ancillary trade, and not as either a side-line for established farm units or, even less, a system to which farmers may turn in unprofitable times. Hill and marginal areas lend themselves particularly to the substitution of trading methods and practices. Wherever it occurs it should be considered a sub-normal type of good farming practice.

5. *Labour forces in hill and marginal systems.* In hill and marginal areas "family farming" is a well-established type in which all the forms of industry retrenchment and industry defences

can be most readily introduced. Whether a contemporary wage structure, an inclination to leave the family holding at an earlier age than hitherto and other purely social considerations will not weaken family labour resources remains to be proved. The feature of inherited capital has hitherto marked the economic distinction and disability of marginal areas, particularly in relation to deadstock considerations. The durability of simple horsedrawn implements is self-evident. Motorisation, even more than mechanisation, incurs maintenance costs which may be disproportionate to the amount of true profit it can earn. Replacement to avoid obsolescence, a depreciation time factor related to the cost and provision of spare parts are relatively new considerations with a range of potential effect on profitability. Where motorisation rather than mechanisation of the farm unit is undertaken, repercussions on farm profits are likely to become increasingly evident. Possibly these effects may be destined to be ascribed to more superficial though less exact reasons. At this point the need for technical education capable of endowing a rising generation with the power of analysis in relation to their skills becomes evident.

The lack of technical and other types of specialised education, which is a feature of marginal areas, here takes its place in the circle of disabilities. The cost of remote rural education, whether established forms or part-time specialities, particularly of a technical nature, is an example of the special disadvantage remote situations incur.

Where small hardy family farm units occur in source-land and lateral valley headlands, such units are particularly prone to family migration to more favoured units. Provided such families are replaced by similar, or potentially similar, units this is an entirely desirable progression. Modern fashion, however, is less tolerant of hard years in the remote uncompromising austerity, which this type of settlement entails. While in profitable eras the size of headland holdings tends to increase by the acquisition of neighbouring holdings, when such migration occurs, the lower ring, geographically, of this type of holding tends to appreciate in rental value in a given district. The comparatively high rental values allied to lack of cash-crop facility promotes a permanent state of affairs where little capital for expansion is readily available. In most of these types of holding capital investment judiciously undertaken either by landlord or tenant could produce a high degree of increased output in a comparatively short time. It must not, of course, be promoted to a

degree where a change of system is incurred or contemplated. It is at this point that the effect of the intensity and disposition of capital, both fixed and working, appears. The point at which either the laws of increasing or decreasing returns come into operation at a varying time limit demands economic acumen which is rarely the endowment of either landlords or their tenants. In point of fact, where holdings are merged, all too often it is the converse which is the case. Rarely is an acquired holding of the headland type, when added to an existing unit, developed to the hilt. Successful tenants who move on are, moreover, often those who have tended most to deplete resources. Mercifully this type of holding is not unduly prone to any form of land "mining." Overstocking, especially with sheep, brings its own nemesis in the form of lessened values and high death rates.

6. *General factors affecting hill and marginal areas.* A word is indicated on the particular factors sheep farming proper brings. Its main disability (without subsidy assistance) is the seasonal money return, derived from lamb and draft sales, wool sales and the like, in relation to an increased weekly requirement of cash resources. This point has already been noted under section 2. Secondly, hill sheep farms require a skilled and a seasonal labour force no longer forthcoming, and thirdly, there is an apparently greater profitability in, and certainly a greater social inclination towards, dairying systems wherever they can be introduced. This third point can be dangerously illusionary. Hill dairying is too often productive of poor-quality milk which the consumer, as well as the dairy farmer jealous of a high reputation for the dairying industry (as who should not be?), both rightly deplore. Side tracking such as improvised or part-time dairying masks the hill and marginal land problem, and, moreover, provides financial improvisation by means of the production of a poor product—a very undesirable feature. The sheep farm proper, disregarding subsidy questions, probably reaches as near the goal of available cash crop—the desired objective—as any other one type of hill or marginal system.

To this structure of relatively low earning power and relatively stable conditions, in which a traditionally simple standard of living and spending plays a large part, comes a demand for extension of production per acre. Present requirements favour this extension mainly in the form of hardy breeding cattle, capable of furnishing store animals for the finishing markets of the lower country.

It is profitable to endeavour to decide exactly where the extra

capital involved will fall within the structure, and at what point profit will be derived in relation to costs of production.

1. *As a preliminary to the breeding and rearing of large extra numbers of beef animals a proper provision of at least a proportion of stock-proof fences on each holding, or their refurnishing, is essential.* Grazing can be well conducted and reasonably regulated only where some degree of control can be extended over various classes of animals, even in large areas. Especially is this the case where bulls are run with herds or with bunches of heifers, as is indispensable for beef ranging. Secondly, a reasonable resting period for grazing areas reduces the incidence of worm infestation in particular, and allows secondary grazing to be carried out with some degree of accuracy. Even the systematic re-installation of boundary fences would in many cases and in the most remote parts prove a financial conundrum were the matter to be painstakingly remedied. The present trend towards the use of wire fences is no proper solution, owing to their deterioration in severe snowstorms, high rate of depreciation, lack of shelter facilities and in general the short life of wire erections. Blame allocated, however rightly, to the past is no remedy for the deficiencies of the present, and deterioration of fencing is a long-term symptom of land deterioration well rooted in the past.

The Agriculture Act 1947 and marginal land grants give some degree of remedy, provided incentive for the task is forthcoming. Rightly regarded, the hill sheep subsidy should be used in part for capital purposes, but this pre-supposes a permanent and not temporary type of fence, not subject to short-term depreciation. Stone walls or stout posts and rails are therefore preferable. There is little evidence that in marginal areas the sheep subsidy is regarded as capital supplementation, although a degree of wire-fence erection is being undertaken at tenants' expense. For the permanent type of provision there is a further complication between tenant and landlord—allocation of capital responsibility. To the latter no direct form of assistance is available, although some assistance on a group basis is available under complicated regulations.

2. *Capital sums required to provide and instal beef cattle herds.* That the cattle would be forthcoming should real demand be there is a matter which could safely be left to the capability of the dealers and suppliers ancillary to the agricultural industry. This inter-industry trading capacity has a resource which should not be under-estimated, but it is essential that a right degree of potential profit margins should be forthcoming. The point on

which hill farmers are likely to hesitate is the long-term lock-up character of such a capital undertaking. Some three or four years may well be expected to pass before the first profits fall due. Even if proportionate turnover of capital by re-sale of a section or special part of the purchase were undertaken, this involves inconvenient overheads such as haulage, herding and so on. It is at best an improvisation based on the long-term financial prospects of the undertaking, " in-and-out " farming in fact. As an improvisation for cash cropping in hill and marginal areas this type of farming has already been discussed. Beef cattle need established familiar surroundings to thrive to the best advantage, and short-term changes have more influence on weight-for-age and grade than might be casually supposed. The serenely bred animal reared in familiar surroundings is altogether a better proposition from all viewpoints than the animal of the same type and breed who may have made two or three market changes before its finishing process. In times when a concentrated finish of any kind is cut to a minimum this point has significance. Moreover, with the time lag on profit realisation involved, alterations in real values may have interposed, making an undue disparity between capital invested and subsequently realised profits.

3. *The question of winter feed.* Winter feeding for increased numbers may involve either direct fodder purchase or one of the methods of meadow and pasture improvement or installation. With the practice of short-term leys, which has become commonplace in more favoured parts, a ready supply of seeds hay for extra fodder in times of need could be left to inter-industry provision through normal trade channels. The question of price in this respect is dealt with later.

4. *The supply and housing of a suitable labour force.* Beef production in high places is a better-proportioned proposition than the establishment of hill-type dairying. The headage that can be tended per man hour is commendably high, and employs instinctive capacities, an inherent " stock-sense," which is less speculative as a characteristic than true intelligence amongst those prepared to live in hill country. A true degree of intelligence is required to operate dairying units satisfactorily. Moreover, alternative work is possibly less available or attractive to the " stock-sense " type of worker. Modern intelligences appear to favour mechanised work, while the light-hearted operation of a jeep or land car may serve to keep the " stock-sense " type of worker in the place of his calling.

5. *Some comment on the effect of the womenfolks' attitude to these hill places should be made.* There is no doubt that the superficial education of girls and young women, together with the effects of the newspaper, journals and cinema, with the combined bias they contribute towards a sophisticated and largely urban type of environment and menfolk, is a major influence in the ill balance in so many fashions from which hill and marginal land suffers. The country wisdom and human, if somewhat uncouth, kindliness which often characterise the outwardly rough and unpolished hill youngster makes less appeal to the country lass of contemporary years than perhaps to previous generations of women. The fact that natural selection in hill and marginal places is directed more on a type basis than towards material suitability, once a strong factor, is an observation which may be made over the years in specific areas. The subtle interplay of such factors, the effect on marriage rates, ages and other biological data, may well have an effect on the depopulation rate of the countryside other than by definite migration.

In addition, there are the special disabilities of remoter holdings to the farm housewife—the lack of modern amenity, the combination of outdoor and indoor work, the general inconvenience of a hard life in outdated premises, to say nothing of all too frequent dissatisfaction with specific requirements such as maternity and child-welfare services. These latter are only too often well below the standards which have come to be the accepted commonplace in the towns. While urban conditions, as such, are rightly unacceptable in the countryside, a parity of modern progress should be accepted as equally desirable for the remotely situated country mother as for her urban counterpart. All too often this is not so, and plays its part in the lessened number of women, young or old, to whom a remote life is acceptable or even tolerable.

6. *Educational aspects of hill and marginal life.* It is sometimes imagined that æsthetic appreciation of the countryside is allied to the higher intelligence quotients, and that right education in itself would develop contentment with remote conditions. What appears more certain is the addiction of the lower intelligence quotients towards the place of their birth and breeding. This also is a matter of observation between those that stay and those that leave specific places. The points should be borne in mind by those who have the direction of rural education in hand in days of transition. It points in overall consideration in favour of

education authorities who hold the view—not that adopted as national policy under the Education Act of 1944—that there is much to be said for a heterogeneous type of school life, rather than one of unilateral divisions. The comparative mixing of all types of intelligences would seem to have advantages as a preparation for the art of living in remote rural conditions. The comparative segregation of the best intelligences under the unilateral systems may well tend towards an attitude of mind favouring drift at a later age towards places of supposedly superior culture.

Any factors which help to install a popular notion that farm life gives definitely less advantages than that of the most manual of urban lives have a wide bearing on the whole question of provision and maintenance of the remotely situated labour force. Where purely social matters are concerned an incentive of high wages offered in hill places, even when both cash payment and perquisite are favourable in relation to the more intensive work required on arable farms (both rates related to basic rates and hours), makes little or no appeal. Ill-balance of the social mind is not the least resolutely insoluble factor which a detailed examination of the problem reveals. There is no easy solution. The problem is fundamental when reduced to its simplest form, and, for such, evolution and the process of natural adjustment to circumstances are perhaps the only satisfactory answers. With the disintegration of accepted forms during an evolutionary process, Nature is obdurately unconcerned. It may be debated whether anything less than the pressure of primitive forces of survival at work can reverse the present trend of drift and depopulation in remote areas. Without such a halt the chance of a widespread extension of the present use of marginal and hill land is not practicable, nor will extension of use occur in anything but fragmentary artificial forms, of little significance to the national need.

There remains then the question of what constructive remedies can be applied for the extension of production systems in such areas.

1. The continuation, by local authority encouragement, of such efforts to remedy all defects inherent in areas of low rateable value and specific measures where practicable.

2. The recollection that remote areas may need current advances in social measures, special services and costly public works, particularly adapted to meet special needs.

3. The establishment and maintenance of financial guarantees where the product, such as beef, is a national necessity. This is

already a satisfactory policy in the current negotiation structure, and guaranteed prices. Means of production other than financial considerations must also be considered, of which quantity as well as type foodstuffs is a major requirement.

4. Such special measures as may be needed to combat the underlying problem of deficient cash-crop earning power, or by so reducing specific costs of production as to counterbalance the effect.

The fact that current results in large-scale State experiments in marginal land areas, such as the African groundnut scheme, have, even with State resources, difficulties with the amount of capital required, should be sufficient evidence to suggest that the difficulties have a common basis, economic in origin, inherent to marginal land.

Over the whole problem the following reflections arise :

1. *Capital and credit facilities.* That the subsidy of individual enterprise by grant or other means is not entirely satisfactory has already been noted in considering the nature of marginal land subsidy. It follows therefore that it is the installation of improved capital facilities for individuals, with a steadiness of interest rates, which is a key factor in the matter. Such capital would be usefully available as working capital, and not exclusively available on guarantee of land or real estate. Land or real estate guarantees are obviously not always available for tenants. In a banking system already theoretically nationalised a definite policy on a broader front than at present prevails would be of immense value and long overdue.

2. *Limitation of earning power.* As has been shown, limitation of earning power is a crucially restrictive factor. State intervention for the encouragement of productive enterprise could profitably be directed towards a lowering of such extraordinary risks as have been shown to be inherent in such areas. The reversal of the present policy in lifting animal feeding-stuffs subsidies is thus indicated. Indeed, it is a matter of opinion whether such commodity subsidy re-imposed could not readily supersede headage subsidy, and would encourage the keeping of the optimum number to ensure maximum profits. The keeping of stock is encouraged immensely by availability of reasonably priced foodstuffs, even in times where other factors are less propitious. Instinctive factors, never far from the conduct of the simpler systems of farming, play a part in this foodstuff availability incentive, in greater proportion perhaps than more orthodox financial incentives.

With a subsidy on numbers, profits are statistically deter-

mined at present, and stocking can possibly be subject to deliberate undesirable limitation. A low-priced foodstuff policy could possibly be allied to an altitude basis in somewhat the same way as the present sheep subsidy is.

Such State intervention, superseding headage payments of all sorts, by providing a focus for the ebb and flow of conflicting conditions of such areas might well partially resolve deep-seated problems by the stimulation such a policy would bring. In so far that it is mainly altitude which defines the occurrence of this type of land it should not be difficult to define the areas where such specified application should apply. More than any other one factor, cheap and plentiful supplies of fodder and feeding-stuffs could resolve other problems. Plans to grow these crops *in situ* in such areas are seldom practicable. Costs of production are no less a disability than the effect of temperature on germination. Ample feeding-stuffs enable the progression of cause and effect to provide play and interplay to the best advantage. Moreover, such a policy would interlock well with the structure of guaranteed prices common to the whole industry.

No superficial platitudes unrelated to the actual conditions in such areas will create the tide of incentive and enthusiasm required to bring extensive plans into practical being, and to final national advantage.

J. M. RITCHIE

PROFESSOR GOODWIN'S MATRIX MULTIPLIER [1]

In his interesting article, "The Multiplier as Matrix," [2] Professor Goodwin draws two significant generalisations, first, that "there is no simple income–expenditure lag as ordinarily assumed in multiplier analysis" (p. 553), and secondly, that "the dynamical-matrix multiplier can be shown to have necessarily an oscillatory element in its behaviour" (p. 538). I wish in the first section of this paper to point out that the first of these assertions does not logically invalidate simple-multiplier analysis, as it might seem to suggest, but rather represents a difference between the assumption of simple-multiplier analysis and matrix-multiplier analysis. In the second section of this paper I shall demonstrate that the second of the above assertions is incorrect, and that, on the contrary, the multiplier cannot have an oscillatory element in its behaviour, provided that no marginal propensity to spend is negative and that autonomous injections of expenditure are not of opposite sign.

I

1. An implicit assumption of the Keynesian system, Professor Goodwin shows, is that Say's Law applies to firms (p. 543).[3] This means that all firms' receipts must be spent, so that money received by firms eventually finds its way back to income

[1] I have much benefited in the preparation of this paper from valuable discussions with Professor Fritz Machlup, and from mathematical advice from Professor A. H. Clifford.

[2] Economic Journal, Vol. LIX, No. 236, December 1949, pp. 537–55.

[3] This, of course does not include firms such as banks, insurance companies and trust companies, to the extent that their "output" consists of securities rather than commodities. Such firms must be considered (to borrow a phrase from Dr. Oscar Lange) as having a zero, rather than a unit, marginal propensity to spend back to households, for otherwise savings would not constitute a leakage. Similarly, Say's Law does not apply, in the Keynesian system, to other non-income recipients such as governments and foreign countries, as it does in the classical system; that is, taxes and imports, as well as savings, are leakages in the Keynesian system, for there are no automatic mechanisms such as balanced budgets, balanced foreign trade and sensitive capital markets, to bring them back into the income stream in the form of government expenditure, exports and investment. For the concept of a "marginal propensity to spend back" see Oscar Lange, "The Theory of the Multiplier," *Econometrica*, Vol. 11, Nos. 3 and 4, July–October 1943, pp. 232–5; for the equivalent recently developed concept of an "international refection ratio" cf. J. J. Polak, "An International Economic System," (abstract), *Econometrica*, Vol. 18, No. 1, January 1950, pp. 70–2.

recipients, in the form of wages and profits (including undistributed profits).[1]

A further assumption which must be made as soon as the Keynesian system is formulated dynamically is that income-propagation periods[2] are of uniform duration throughout the economy. As a special case of this assumption (but by no means necessarily) we may assume income recipients' transaction periods[3] to be uniform in length and non-income recipients' transaction periods to be of zero duration; that is, we may assume that income recipients spend their receipts after a lag, whereas non-income recipients spend their receipts instantaneously. This is what Professor Goodwin feels is the usual assumption;[4] it is certainly not the assumption made, however, by Machlup, Angell and Villard.[5]

[1] Retained profits, since they are a part of national income, may be regarded as paid by firms to "earners of retained profits," as I have pointed out in my unpublished paper, "The Multi-Part Multiplier" (presented at the annual meeting of the Econometric Society, New York, December 28, 1949). The fact that marginal costs are less than price, therefore, does not mean that firms' marginal propensities to spend are less than unity, as Professor Goodwin implies (p. 544). It is only to the extent that changes in receipts are accompanied by changes in firms' debt-holdings that firms' marginal propensities to spend will be different from unity. Thus if the proceeds of receipts are used to retire debt outstanding (as in the case of depression conditions with excess inventory accumulation) or are accompanied by additional debt-creation, firms' marginal propensities to spend will be respectively less than or greater than unity. But "internal financing, failure to disburse earnings," and the fact that "marginal cost is . . . well below price" do not in themselves prevent Say's Law from operating among firms, as Professor Goodwin implies (p. 543). Corporate income taxes will, however, make firms' marginal propensities to spend in effect less than unity, if the government does not spend the proceeds.

[2] The income-propagation period is defined by Dr. Machlup as "the length of time which it takes for the money in active circulation to complete a circuit flow from income recipient to income recipient." Fritz Machlup, "Period Analysis and Multiplier Theory," *Quarterly Journal of Economics*, Vol. LIV, November 1939, pp. 1–27, reprinted in *Readings in Business Cycle Theory* (Blakiston, Philadelphia, 1944), p. 208.

[3] A transaction period, to extrapolate Professor Machlup's definition of the income period, may be defined as the period of time which it takes for the money in active circulation to complete a circuit flow from money-recipient to money-recipient.

[4] ". . . we find that usually one lag is assumed, specifically the one between income and consumption. The obvious extension is to admit a lag between income [meaning, here, receipts] and expenditure for every industry as well." (Pp. 537–8.) This is also the interpretation of Dr. Metzler, who distinguishes between the "Robertson sequence" in which "household expenditure lags" (income recipients' transaction periods) are predominant and "output lags" (transaction period of firms taken as a whole) are negligible, and the "Lundberg sequence" in which the opposite is true; cf. L. A. Metzler, "Three Lags in the Circular Flow of Income," *Income, Employment and Public Policy*, Essays in Honor of Alvin H. Hansen, New York, 1948, pp. 11–32.

[5] Cf. Fritz Machlup, *op. cit.*, including p. 215*n*, where reference is made to the works of Professors Henry H. Villard and James W. Angell.

Because of his assumption of equal transaction periods,[1] Professor Goodwin comes to the conclusion that there is no simple uniform income period, but rather a distributed lag which is composed of a series of transaction periods. Professor Goodwin, if I interpret him correctly, states his position as if his matrix multiplier *showed* that in reality it is transaction periods, rather than income periods, that are of uniform duration, and as if his analysis established the falsity of the simple-multiplier analysis.[2] He makes this assumption for the sake of convenience; the simple (non-matrix) multiplier assumption is also one of convenience.[3]

2. Though it may be a step closer to reality to analyse the flow of money by transaction periods, the assumption of equal transaction periods is, as Professor Goodwin realises, still unrealistic. It is possible, however, by means of a simple device, to allow for unequal transaction periods without unduly complicating the analysis.

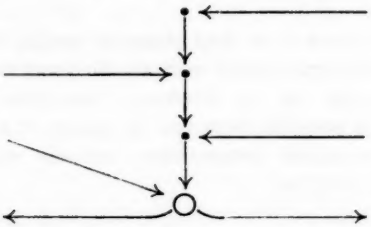
The lag between a firm's receipts and its payments of wages may be expected to be considerably shorter than the lag between its receipts and its payments for certain raw materials and equipment. If a lag between a sector i's receipts and its payments to sector j is twice as long, for instance, as the lag between its receipts and its payments to sector k, then we may simply pretend that there exists a certain collecting agency l, through which the money passes on its way from i to j. Thus the payment from i to j may be regarded as split up into a payment from i to l over one period (i's marginal propensity to spend to l being, in fact, i's marginal propensity to spend to j), and a payment from l to j in the following period (l's marginal propensity to spend to j being equal to unity). In this way we may insert into the economy as many goblins as we please whose sole function is to obey Say's Law and hold up the flow of money!

[1] "I shall now make the assumption that all the lags θ_t are the same and measure time in these uniform unit-lag periods. The more complicated, and realistic, case of unequal lags may be solved in principle, but the gains in simplicity are great from taking them all to be equal" (pp. 545–6).

[2] "One of the many uses which may be made of the dynamic-matrix multiplier is to illuminate the question of what is the nature and magnitude of the lag in the income flow in a society. The answer is that there is no *one* lag but many, endlessly compounded. . . . Therefore there is no simple income–expenditure lag as ordinarily assumed in multiplier analysis, but rather there is a distributed lag that spins out the consequences of any disturbance much longer than any inspection of industry or consumer lags by themselves would lead us to expect" (p. 553).

[3] Cf., for instance, Fritz Machlup, *op. cit.*, p. 211. Dr. Machlup recognises that, in fact, "the time interval between first and second income recipient will be replaced by a series of intervals of different length" (pp. 211–12).

For practical purposes it is desirable to assume a minimum number of different transaction periods. Let these transaction periods all be integral multiples of a certain *standard period*. If the length of this standard period is θ, and if the r transaction periods are (or approximate) integral multiples of θ up to $r\theta$, and if the economy is divided into n sectors, then at most $(r-1)n$ collecting agencies will be inserted into the matrix. This may be shown in a simple diagram, where a circle represents any given sector of the economy, and each dot represents a collecting agency:



The large arrows represent inflows of money from other sectors, and outflows to other sectors and their respective collecting agencies. Depending upon whether inflows come directly or through one or more collecting agencies, the transaction period will be shorter or longer. In this example there are four transaction periods—θ, 2θ, 3θ and 4θ—and each sector therefore has at most three collecting agencies. The third collecting agency has a unit marginal propensity to spend to the second, the second has a unit marginal propensity to spend to the first and the first a unit marginal propensity to spend to the sector of the economy under consideration. Any other sector's marginal propensity to spend to the given sector is treated as a marginal propensity to spend to one of the given sector's collecting agencies, if the outside sector's transaction period is a multiple of θ. It may, of course, turn out that there is a lag of θ and one of 3θ, but none of 2θ; it will still be necessary in this case, however, to provide for the intermediate collecting agency as if the 2θ lag existed.

Since existing time lags cannot be reduced to exact integral multiples of one another without assigning an infinite number of collecting agencies to each sector of the economy, the above refinement is still removed from reality. Nevertheless, our scheme should serve as a close enough approximation to reality to suffice for practical purposes. In empirical work it might be desirable to reduce the number of sectors in order to allow for the introduction of collecting agencies; but the introduction of

collecting agencies, resulting as it does in the mere insertion into the matrix of at most $(r-1)n$ ones and the filling in of the rest of the enlarged $rn \times rn$ matrix with at least $rn(rn-1)$ zeros (so that only rn of the r^2n^2 new matrix elements are non-zero elements—excluding any zeros that may appear in the original matrix), adds but little to the computational difficulties involved in empirical work.

3. From the preceding paragraphs we may draw the following conclusions. (1) If all income periods are of equal length, then there is a simple income–expenditure lag as ordinarily assumed in multiplier analysis. (2) If all transaction periods are of equal length (so that income periods are not of equal length—except as a special case), then the income period is, as Professor Goodwin shows, a distributed lag composed of a number of transaction periods. (3) Since, by definition, there is a uniform standard period (so that neither income periods nor transaction periods are of equal length—except as a special case), then both the income period and transaction period are, in the general case, distributed lags composed of a number of standard periods.

Conditions (1) and (2) are both special cases of (3). It may be no more realistic to assume that transaction periods are of equal length, than it is to assume that income periods are of equal length. Indeed, as members of the Cambridge school have contended, there may very well be greater disparities among transaction periods than among income periods.[1] Neither of these assumptions, however, is necessary for dynamic multiplier analysis.

II

4. Professor Goodwin divides the economy into units small enough so that each unit's marginal propensity to intraspend (as I have called it) is zero, that is to say, that each diagonal element of the multiplier matrix is zero. Since therefore the trace of the matrix (which is the sum of its diagonal elements) is zero, it follows by a well-known property of matrices that the sum of the matrix's characteristic roots, being equal to the trace, is also equal to zero, and hence that not all the roots can be positive and real. Since there must be some negative or complex roots, Professor Goodwin concludes that "not only may this system exhibit oscillatory behaviour—it must do so" (p. 550).

It is possible to demonstrate, however, that not only is this statement false, but the converse is true. Let the matrix a have

[1] This observation was made to me by Dr. Machlup.

all its elements non-negative. Now the matrix multiplier may, as Professor Goodwin has himself shown, be written as a geometric series :

$$dY(t) = [I + a + a^2 + \ldots + a^{t-1}]dE \quad . \quad . \quad (1)$$

where $dY(t)$ and dE are column vectors representing respectively the change in receipts at time t and the autonomous change in expenditure (injections) in parts 1 to n of the economy, and where I is the identity matrix. It is assumed, also, that all the elements in the vector dE are of the same sign.

Now since we assume that no element in a is negative, it follows that no element of any power of a can be negative, for it is impossible to multiply matrices with all non-negative elements and obtain a product matrix with any negative elements. The geometric progression $I + a + a^2 + \ldots$ must therefore be monotonically increasing for every part of the economy. We have therefore proved that, as long as no marginal propensities to spend are negative and no autonomous injections are of opposite sign, not only may this system exhibit *monotonic* behaviour—it must do so. Oscillations are, in this case, impossible.[1]

5. It is an interesting fact, therefore, that we may have a system which necessarily has negative or complex roots, and which is at the same time necessarily non-oscillatory. The reason for this apparently strange result may easily be explained.

The economy may be described by the following system of difference equations :

$$\left.\begin{aligned} dY_1(t) &= dE_1 + a_{11}dY_1(t-1) + \\ &\qquad a_{12}dY_2(t-1) + \ldots + a_{1n}dY_n(t-1) \\ dY_2(t) &= dE_2 + a_{21}dY_1(t-1) + \\ &\qquad a_{22}dY_2(t-1) + \ldots + a_{2n}dY_n(t-1) \\ &\quad \ldots\ldots\ldots\ldots\ldots\ldots \\ dY_n(t) &= dE_n + a_{n1}dY_1(t-1) + \\ &\qquad a_{n2}dY_2(t-1) + \ldots + a_{nn}dY_n(t-1) \end{aligned}\right\} \quad (2)$$

[1] It is quite possible, nevertheless, for the elements I, a, a^2, . . . *themselves* to form an oscillatory series (like a ripple), giving rise to " jerkiness " in the series $I + a + a^2 \ldots$ But such oscillations result only from a *single injection* of expenditure, and not from a constant stream of injections over time, which is the assumption made in Professor Goodwin's article (p. 546). It may readily be seen, furthermore, that—given zero initial values for the vector of disbursements (which implies no restriction, because the vectors $dY(t)$ and dE represent deviations from initial values)—if the vector dE is positive and monotonically increasing with time, or negative and monotonically decreasing with time, there can still be no oscillations in $dY(t)$. Oscillations can therefore arise only if there is oscillation in the stream of injections (a single injection is really an oscillation, for it is a rise in disbursements from zero to the given level followed by a fall back to zero).

where $dY_i(t)$ is the increment in the receipts of part i of the economy at time t, dE_i is the autonomous increment in injections of expenditure in part i, and a_{ij} [1] is part j's marginal propensity to spend in part i. Defining e_i as the proportion of the autonomous increment of expenditure in i to the total autonomous increment in expenditure, and k_i as the multiplier for the ith part of the economy, we have

$$e_i = \frac{dE_i}{\sum_{i=1}^{n} dE_i} \quad \text{and} \quad k_i = \frac{dY_i}{\sum_{i=1}^{n} dE_i} \quad . \quad . \quad . \quad (3)$$

so that equations (2) may be rewritten

$$\left.\begin{aligned} k_1(t) &= e_1 + a_{11}k_1(t-1) + \\ &\qquad a_{12}k_2(t-1) + \ldots + a_{1n}k_n(t-1) \\ k_2(t) &= e_2 + a_{21}k_1(t-1) + \\ &\qquad a_{22}k_2(t-1) + \ldots + a_{2n}k_n(t-1) \\ &\ldots\ldots\ldots\ldots\ldots\ldots \\ k_n(t) &= e_n + a_{n1}k_1(t-1) + \\ &\qquad a_{n2}k_2(t-1) + \ldots + a_{nn}k_n(t-1) \end{aligned}\right\} \quad (4)$$

which may be written in matric form :

$$k(t) = e + ak(t-1) \quad . \quad . \quad . \quad . \quad . \quad (5)$$

where $k(t)$, e, and $k(t-1)$ are column vectors.

The solution of the system of equations (4) is, as I have shown in "The Multi-Part Multiplier," the sum of the solutions of its static and dynamic parts, the static part being

$$\bar{k}_i = \frac{\Delta'_i}{\Delta} \quad . \quad . \quad . \quad . \quad . \quad . \quad . \quad (6)$$

where (following the notation of "The Multi-Part Multiplier") Δ is the determinant of $I - a$ and Δ'_i is the determinant of the matrix formed by substituting the e vector in the ith column of $I - a$ (according to Cramer's rule). The dynamic part is given by

$$\hat{k}_i(t) = \sum_{j=1}^{n} c_{ij}\lambda_j^t \quad . \quad . \quad . \quad . \quad . \quad . \quad (7)$$

where the c_{ij}'s are constants determined by the initial conditions, and the λ_j's are the roots of the characteristic equation

$$|I\lambda - a| = 0 \quad . \quad . \quad . \quad . \quad . \quad . \quad . \quad (8)$$

The solution we want is therefore

$$k_i(t) = \frac{\Delta'_i}{\Delta} + \sum_{j=1}^{n} c_{ij}\lambda_j^t \quad . \quad . \quad . \quad . \quad . \quad (9)$$

[1] In "The Multi-Part Multiplier" I used the equivalent notation $j^{E'}i$.

Let

$$\kappa_{ij} = \frac{c_{ij}}{\Delta'_i/\Delta}; \quad . \quad . \quad . \quad . \quad . \quad . \quad (10)$$

then (9) may be written in the more convenient form

$$k_i(t) = \frac{\Delta'_i}{\Delta}\left(1 + \sum_{j=1}^{n} \kappa_{ij}\lambda_j{}^t\right) \quad . \quad . \quad . \quad . \quad (11)$$

The initial conditions of the system are

$$\left.\begin{aligned} k(0) &= 0 \\ k(1) &= e \end{aligned}\right\} \quad . \quad . \quad . \quad . \quad . \quad . \quad . \quad (12)$$

Given these initial conditions, we can determine, from (5), the value of every $k(t)$. We thus obtain the progression

$$k(t) = [I + a + a^2 + \ldots + a^{t-1}]e \quad . \quad . \quad (13)$$

From (11) we may derive, by giving t the successive values 0, 1, ... , $n - 1$, the system of equations

$$\left.\begin{aligned} &\kappa_{i1} + \kappa_{i2} + \kappa_{i3} + \ldots + \kappa_{in} = l_i(0) \\ &\kappa_{i1}\lambda_1 + \kappa_{i2}\lambda_2 + \kappa_{i3}\lambda_3 + \ldots + \kappa_{in}\lambda_n = l_i(1) \\ &\kappa_{i1}\lambda_1{}^2 + \kappa_{i2}\lambda_2{}^2 + \kappa_{i3}\lambda_3{}^2 + \ldots + \kappa_{in}\lambda_n{}^2 = l_i(2) \\ &\quad . \quad . \quad . \quad . \quad . \quad . \quad . \quad . \quad . \quad . \quad . \quad . \quad . \quad . \quad . \quad . \quad . \quad . \\ &\kappa_{i1}\lambda_1{}^{n-1} + \kappa_2\lambda_2{}^{n-1} + \kappa_{i3}\lambda_3{}^{n-1} + \ldots + \kappa_{in}\lambda_n{}^{n-1} = l_i(n-1) \end{aligned}\right\} \quad (14)$$

where

$$l_i(t) = \frac{k_i(t)}{\Delta'_i/\Delta} - 1 \quad . \quad . \quad . \quad . \quad (15)$$

(14) may be written in the matric form

$$\begin{bmatrix} 1 & 1 & 1 & \ldots & 1 \\ \lambda_1 & \lambda_2 & \lambda_3 & \ldots & \lambda_n \\ \lambda_1{}^2 & \lambda_2{}^2 & \lambda_3{}^2 & \ldots & \lambda_n{}^2 \\ . & . & . & . & . \\ \lambda_1{}^{n-1} & \lambda_2{}^{n-1} & \lambda_3{}^{n-1} & \ldots & \lambda_n{}^{n-1} \end{bmatrix} \begin{bmatrix} \kappa_{i1} \\ \kappa_{i2} \\ \kappa_{i3} \\ . \\ \kappa_{in} \end{bmatrix} = \begin{bmatrix} l_i(0) \\ l_i(1) \\ l_i(2) \\ . \\ l_i(n-1) \end{bmatrix} \quad (16)$$

The above matrix is known as the Vandermonde matrix.

In a similar fashion, we may derive from (9) the multiplier for all sectors of the economy taken together, which may be written in the form

$$\sum_{i=1}^{n} k_i(t) = \frac{\sum_{i=1}^{n} \Delta'_i}{\Delta}\left(1 + \sum_{j=1}^{n} K_j\lambda_j{}^t\right) \quad . \quad . \quad . \quad (17)$$

where

$$K_j = \frac{\sum_{i=1}^{n} c_{ij}}{\sum_{i=1}^{n} \Delta'_i/\Delta} \quad . \quad . \quad . \quad . \quad . \quad (18)$$

From (17) we obtain the matrix equation

$$\begin{bmatrix} 1 & 1 & 1 & \dots & 1 \\ \lambda_1 & \lambda_2 & \lambda_3 & \dots & \lambda_n \\ \lambda_1^2 & \lambda_2^2 & \lambda_3^2 & \dots & \lambda_n^2 \\ \dots & \dots & \dots & \dots & \dots \\ \lambda_1^{n-1} & \lambda_2^{n-1} & \lambda_3^{n-1} & \dots & \lambda_n^{n-1} \end{bmatrix} \begin{bmatrix} K_1 \\ K_2 \\ K_3 \\ \cdot \\ K_n \end{bmatrix} = \begin{bmatrix} L(0) \\ L(1) \\ L(2) \\ \cdot \\ L(n-1) \end{bmatrix} \quad (19)$$

where

$$L(t) = \frac{\sum_{i=1}^{n} k_i(t)}{\sum_{i=1}^{n} \Delta'_i/\Delta} - 1 \quad \dots \quad (20)$$

6. Before proceeding to analyse the general case, we may consider the special Keynesian case. We assume, therefore (as we saw above), that (1) Say's Law applies to firms and (2) income-propagation periods are of equal duration throughout the economy. We may therefore treat households as a closed system.[1]

Dividing households into n component parts, we may describe the economy by the above system of equations (2). The sum of all these equations gives us national income :

$$\sum_{i=1}^{n} dY_i(t) = \sum_{i=1}^{n} dE_i + \sum_{j=1}^{n} \sum_{i=1}^{n} a_{ij} dY_j(t-1). \quad (21)$$

Substituting (3) in (17) we may transform (17) into the equation for the multiplier for the whole economy :

$$\sum_{i=1}^{n} k_i(t) = 1 + \sum_{j=1}^{n} \sum_{i=1}^{n} a_{ij} k_j(t-1). \quad \dots \quad (22)$$

Now the Keynesian assumptions imply that each part of the economy has the same marginal propensity to spend, that is, that every $\sum_{i=1}^{n} a_{ij}$ is the same for every j. Let every $\sum_{i=1}^{n} a_{ij} = \alpha$. Then (18) reduces to the simple difference equation

$$\sum_{i=1}^{n} k_i(t) = 1 + \alpha \sum_{i=1}^{n} k_i(t-1) \quad \dots \quad (23)$$

whose solution is

$$\sum_{i=1}^{n} k_i = \frac{1}{1-\alpha}(1 - \alpha^t) \quad \dots \quad (24)$$

which is the simple dynamic multiplier.

In this case, $\sum_{i=1}^{n} \Delta'_i/\Delta = \frac{1}{1-\alpha}$. Substituting this and (24) in (20) we therefore have

$$L(t) = -\alpha^t \quad \dots \quad (25)$$

[1] This was shown by Professor Goodwin for the static case (pp. 542–3).

Equation (19) therefore becomes :

$$\begin{bmatrix} 1 & 1 & 1 & \dots & 1 \\ \lambda_1 & \lambda_2 & \lambda_3 & \dots & \lambda_n \\ \lambda_1^2 & \lambda_2^2 & \lambda_3^2 & \dots & \lambda_n^2 \\ \cdot & \cdot & \cdot & \cdot & \cdot \\ \lambda_1^{n-1} & \lambda_2^{n-1} & \lambda_3^{n-1} & \dots & \lambda_n^{n-1} \end{bmatrix} \begin{bmatrix} K_1 \\ K_2 \\ K_3 \\ \cdot \\ K_n \end{bmatrix} = \begin{bmatrix} -1 \\ -\alpha \\ -\alpha^2 \\ \cdot \\ -\alpha^{n-1} \end{bmatrix} \quad (26)$$

We also know from (20) that α satisfies our system of equations, that is, that one of the roots—say λ_s—must be equal to α. Hence the vector on the right of the equality sign is equal to the sth column vector of the Vandermonde matrix, with sign changed. Now the value of the ith constant in the vector of constants is equal to the ith-column Cramer determinant, divided by the determinant, of the Vandermonde matrix.[1] Thus the sth-column Cramer determinant will be simply the negative of the Vandermonde determinant, and all the other Cramer determinants will vanish because they will contain two linearly dependent column vectors.[2] The sth constant is therefore equal to minus unity, and all the other constants vanish. Thus, in the Keynesian case, one of the roots is equal to the marginal propensity to spend, and all the other roots are annihilated. The other roots can be as negative or complex as they please, and yet the multiplier will show no oscillations !

7. We may now see how, in the general case, the multiplier (provided all marginal propensities to spend are non-negative, and no autonomous injections are of opposite sign) cannot oscillate, regardless of the fact that it may have negative or complex roots.[3] If individual marginal propensities to spend are unequal, then one of the roots will be a weighted average of marginal propensities to spend, and will have a coefficient which is not very different

[1] We use the expression ith-column Cramer determinant to mean the determinant of the matrix formed by replacing the ith column of the Vandermonde matrix by the vector on the right of the equality sign.

[2] We assume, as does Professor Goodwin, that all the characteristic roots are distinct, so that the Vandermonde matrix is itself non-singular.

[3] The explanation which follows is still in terms of total transactions (or, if the assumptions of the preceding paragraphs with regard to Say's Law and equal income periods are maintained, in terms of total income) rather than in terms of the receipts of any part of the economy; that is, it is still an analysis of equation (16) rather than equation (19). Some simple examples will show that "jerkiness" in the stream of any sector's receipts results, not from jerkiness in the stream of total transactions, but from jerkiness in the flow of money from one sector of the economy to another. Professor Goodwin does not seem to be justified, therefore, in holding that "practically without exception, total transactions, national income and the other sector outputs move up and down together" (p. 554).

from -1, whereas the other roots will be virtually annihilated by small coefficients. The effect of negative and complex roots will be to make the passage of income less smooth than it would be when propensities to spend are unequal; but negative and complex roots will never be able to offset the dominant root enough to prevent the solution from being monotonic.

The characteristic roots of the matrix therefore have little to do with the oscillatory behaviour of the system. The existence of negative or complex roots is a necessary, but not sufficient, condition for oscillatory behaviour, provided that autonomous injections into the economy are all of the same sign; a sufficient condition for monotonic behaviour, under these circumstances, is that all marginal propensities to spend be non-negative. As a rule such a condition will hold, but negative marginal propensities to spend should not be ruled out as impossible.[1] If, however, autonomous transfer of income is included in the multiplicand, so that the vector e contains elements of opposite sign, then the existence of negative or complex roots is not even a necessary condition for oscillatory behaviour. Even if all roots are positive and real, it is quite possible for the passage of income through time not to be monotonic.[2] The existence of negative or complex characteristic roots is therefore neither a necessary nor a sufficient condition for oscillatory behaviour.

We may then ask whether the same situation holds in the case of the analysis of stability conditions. Fortunately it will be found that if no element of the matrix is negative, no characteristic root which is greater than unity will be annihilated. If the matrix elements are allowed to be of any sign, however, it is possible to devise cases in which roots which lie outside the unit circle of the complex plane are annihilated or virtually annihilated.[3] In such a case, the condition that the latent roots of a matrix lie within the unit circle of the complex plane is a sufficient but not a necessary condition for stability.

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[1] Negative marginal propensities to spend will exist if a large proportion of people's budgets is devoted to inferior goods. Governments will have negative marginal propensities to spend in the private economy if they react to changes in tax yields by changing expenditure in the opposite direction.

[2] For a discussion of the "waves" in income which may follow an export from one sector of an economy to another, see Fritz Machlup, *International Trade and the National Income Multiplier*, The Blakiston Co., Philadelphia, 1943, *passim*.

[3] For instance any root which does not lie within the unit circle will be repectively annihilated or virtually annihilated if the column sums of the matrix are equal or nearly equal, and less than unity, so that income will still be stable or virtually stable.

DOES THE MATRIX MULTIPLIER OSCILLATE?

THE question is: does the multiplier process as worked out by Kahn and Clark, but expanded to include inter-firm and government payments, give rise to cycles? The answer is certainly yes, but, as Mr. Chipman shows, there is a special case in which it does not, and it is exactly this special, and unrealistic case which multiplier theorists usually talk about. The correct statement is that there is *latent* in the transactions structure of society the possibility of oscillation, but that this may or may not be brought out according to the circumstances.

The easiest way to see this is by crude numerical examples. Suppose that we divide the American economy into three sectors, Business, Government and Households, and that we select values of the propensity-to-spend matrix that are suggestive of the data for around 1940 (collinearity makes the values doubtful). All inter-firm, inter-government and inter-household payments are suppressed to preserve the formal likeness with a proper, more elaborate subdivision. Our system is then

$$\begin{bmatrix} 0 & \cdot 14 & \cdot 70 \\ \cdot 14 & 0 & \cdot 05 \\ \cdot 58 & \cdot 45 & 0 \end{bmatrix} \begin{Bmatrix} B(t) \\ G(t) \\ H(t) \end{Bmatrix} + \begin{Bmatrix} I_1(t) \\ I_2(t) \\ I_3(t) \end{Bmatrix} = \begin{Bmatrix} B(t+1) \\ G(t+1) \\ H(t+1) \end{Bmatrix} \quad . \quad (1)$$

where the Is are the total injections by sector. To get the time-series solutions, for either variable or constant Is, we take the values of B, G and H at time t, multiply by the square matrix (across and down), add the appropriate Is, to get the current receipts, which are the basis for expenditures in the next period. Thus to get $H(3)$, we add $0{\cdot}58B(2)$, $0{\cdot}45G(2)$, and $I_3(2)$.

First consider a constant level of injections, from $t = 0$ on, with the values 23, 0, 18 and given initial levels of B, G and H. The resulting evolution of the system is as follows:

t	0	1	2	3	4	5	. . .	∞
B	72	77	71	73	71	71	. . .	71
G	16	14	13	13	13	13	. . .	13
H	74	66	69	65	66	65	. . .	65

Evidently we can have oscillations, and these are damped since the system is stable. As a special case we may take a system which was in equilibrium initially. Assuming the injections to change,

at $t = 0$, from 23, 0, 21 to 18, 0, 26 and to remain there forever, we have the following:

$$\begin{array}{cccccccccc} t & 0 & 1 & 2 & 3 & 4 & 5 & . & . & . & \infty \\ \begin{Bmatrix} B \\ G \\ H \end{Bmatrix} & \begin{Bmatrix} 74 \\ 14 \\ 70 \end{Bmatrix} & \begin{Bmatrix} 69 \\ 14 \\ 74 \end{Bmatrix} & \begin{Bmatrix} 72 \\ 14 \\ 72 \end{Bmatrix} & \begin{Bmatrix} 70 \\ 14 \\ 74 \end{Bmatrix} & \begin{Bmatrix} 72 \\ 14 \\ 73 \end{Bmatrix} & \begin{Bmatrix} 71 \\ 14 \\ 74 \end{Bmatrix} & . & . & . & \begin{Bmatrix} 72 \\ 14 \\ 74 \end{Bmatrix} \end{array}$$

Therefore, even if the system is in equilibrium, but if the injections move in opposite directions, oscillations may arise. Incidentally this is the kind of case which aggregative analysis cannot distinguish, for the total amount of the injections is never changed. As a still more special case we may consider an economy in equilibrium subjected to a single shift in injections, all in the same direction. Given a shift from 23, 0, 21 to 26, 0, 22, we get the following vector-time series:

$$\begin{array}{ccccccccc} t & 0 & 1 & 2 & 3 & 4 & 5 & . & . & . & \infty \\ \begin{Bmatrix} B \\ G \\ H \end{Bmatrix} & \begin{Bmatrix} 74 \\ 14 \\ 70 \end{Bmatrix} & \begin{Bmatrix} 77 \\ 14 \\ 71 \end{Bmatrix} & \begin{Bmatrix} 78 \\ 15 \\ 73 \end{Bmatrix} & \begin{Bmatrix} 79 \\ 15 \\ 74 \end{Bmatrix} & \begin{Bmatrix} 80 \\ 15 \\ 75 \end{Bmatrix} & \begin{Bmatrix} 81 \\ 15 \\ 75 \end{Bmatrix} & . & . & . & \begin{Bmatrix} 81 \\ 15 \\ 76 \end{Bmatrix} \end{array}$$

Here all sectors vary monotonically, though irregularly and interdependently. This is the only case considered by Mr. Chipman, and he correctly states, what I failed to see, that in no such case can oscillations arise. These examples (and (12) below) show that the matrix multiplier may or may not give rise to cycles, depending on how the system is excited, and it is this which I intended to convey in my paper.

In the first and second examples we get a type of behaviour which cannot occur in the simple multiplier, which is always monotonic for a single change in the level of injections. In fact, if we make the maximum aggregation consistent with Keynesian analysis, considering only firms and households (but taking each to have a receipts–expenditures lag) we still easily get oscillations, as the reader may verify by trying it.

To distinguish the various cases, consider an economy with a constant level of injections, $\{B\}$ which changes at time zero to $\{B + \Delta B\}$. The various ΔBs need not, and often will not, be of the same sign. Given, for $T \geqq 0$,

$$\{y(t+1)\} = [a]\{y(t)\} + \{B + \Delta B\} \quad . \quad . \quad . \quad (2)$$

we consider first the associated homogeneous equations,

$$\{y(t+1)\} = [a]\{y(t)\} \quad . \quad . \quad . \quad . \quad . \quad (2a)$$

There exists a linear transformation $[h]$,

$$\{y\} = [h]^{-1}\{\eta\} \quad . \quad . \quad . \quad . \quad . \quad . \quad (3)$$

such that, substituting (3) in (2a),

$$\left.\begin{aligned}\{\eta(t+1)\} &= [h][a][h]^{-1}\{\eta(t)\} \\ &= [c]\{\eta(t)\}\end{aligned}\right\} \quad . \quad . \quad (4)$$

where $[c]$ is a diagonal matrix with the n distinct roots of $[a]$ along the diagonal. The general solution will be of the form

$$\{\eta(t)\} = [\lambda]^t\{N\} \quad . \quad . \quad . \quad . \quad . \quad (5)$$

where $\{N\}$ consists of n arbitrary constants. Hence

$$[\lambda]\{\eta\} = [c]\{\eta\}$$

or

$$[\lambda - c]\{\eta\} = \{0\}$$

If we ignore the trivial, null solution, then we must have an arbitrary $\{\eta\}$,

$$[\lambda] = [c] \quad . \quad . \quad . \quad . \quad . \quad . \quad (6)$$

so that $[\lambda]$ is diagonal with the roots along the diagonal. Hence

$$\{y(t)\} = [h]^{-1}\{\eta(t)\} = [h]^{-1}[\lambda]^t\{N\} \quad . \quad . \quad . \quad (7)$$

By adding a particular solution of (2), such as

$$\{Y\} = [I - a]^{-1}\{B + \Delta B\} \quad . \quad . \quad . \quad (8)$$

to (7), we get the complete solution, which is then

$$\{y(t)\} = [h]^{-1}[\lambda]^t\{N\} + [I - a]^{-1}\{B + \Delta B\} \quad . \quad (9)$$

Thus our solution has a statical part, the new equilibrium values, and a dynamical part, the form of which for a typical sector is

$$y_i(t) = k_{i1}N_1\lambda_1{}^t + k_{i2}N_2\lambda_2{}^t + \ldots\ldots + k_{in}N_n\lambda_n{}^t$$

where the k_{ij}s are the elements of $[h]^{-1}$. Thus all sectors have latent in them the same constituent motions, except that they are combined in different proportions. Because of the asymmetry of the matrix $[a]$ these roots need not be all real, and because of the zeros along the principal diagonal they cannot all be real and positive. Therefore, for arbitrary initial conditions, it is always possible to have oscillations. As a result of further search in the literature for indications about the nature of these roots, I have found a most interesting theorem of Frobenius (my translation):

> "If the elements of a matrix A are all real and positive, then its characteristic equation has a root r, which is real,

positive, simple, and of absolute magnitude greater than every other root. If $s \geqq r$, then the elements of the adjoint of $sI - A$ are all positive." [1]

This means that if the system is excited in such a way that, for one or more sectors, there is an oscillation which overshoots the equilibrium, eventually, if there is no further disturbance, a monotonic root must dominate, leading to a cessation of overshooting (alternations of sign in deviations from equilibrium) but not a cessation of oscillation. On p. 476 of the same paper Frobenius proves another theorem of great interest to economists. " If the elements a_{ik} of an n by n matrix are all positive, then the greatest characteristic root lies between the greatest and least of the n numbers

$$a_\alpha = a_{\alpha 1} + a_{\alpha 2} + \ldots\ldots + a_{\alpha n} (\alpha = 1,2 \ \ldots\ldots \ n)."$$

Since a matrix and its transpose have the same characteristic roots, this proves immediately that our system is stable in consequence of the assumption of all marginal propensities to spend less than one (all columns of $[a]$ add to less than one).

Which of the system's modes of motion will be excited and to what degree depends on the deviations of $\{y\}$ from its new equilibrium values at time zero. The n*N*s are uniquely determined by

$$\{N\} = [h]\{y(0) - \bar{Y}\} \ . \ . \ . \ . \ . \ . \quad (10)$$

Since these deviations may be positive or negative, large or small, there seems to be no significant limitation of the *N*s, so that in general all motions, including at least one oscillation, will be excited. I fail to see that Mr. Chipman has successfully challenged this fact. If we have the special case of the economy in equilibrium,

$$\{y(0)\} = [I - a]^{-1}\{B\},$$

and hence

$$\{N\} = -[h][I - a]^{-1}\{\Delta B\}.$$

If further all the ΔBs are of the same sign, and if there is no further change for some time, then as Mr. Chipman shows, there will be no oscillation. There is also the still more special case in which the economy happened to be in its new equilibrium position, so that $\{y(0) - \bar{Y}\}$ is zero, and then *all* *N*'s are zero and no motion of any kind occurs.

[1] G. Frobenius, "Ueber Matrizen aus positiven Elementen," in the Sitzungsberichte der Koeniglich Preussischen Akademie der Wissenschaften, 1908, XXVI, p. 471.

To show these results, we substitute (10) in (9) giving

$$\left.\begin{aligned}\{y(t)\} &= [h]^{-1}[\lambda]^t[h]\{y(0) - \bar{Y}\} + \{\bar{Y}\} \\ &= [h^{-1}\lambda h]^t\{y(0) - \bar{Y}\} + \{\bar{Y}\} \\ &+ [a]^t\{y(0) - \bar{Y}\} + \{\bar{Y}\}\end{aligned}\right\} \quad (11)$$

To test for monotonicity, consider the sign of the increment,

$$\left.\begin{aligned}\{\Delta y(t)\} &= \{y(t+1)\} - \{y(t)\} \\ &= [a]^t[a]\{y(0) - \bar{Y}\} + \{\bar{Y}\} - [a]^t\{y(0) - \bar{Y}\} - \{\bar{Y}\} \\ &= [a]^t[a - I]\{y(0) - \bar{Y}\} \\ &= [a]^t[-[I - a]]\{y(0) - [I - a]^{-1}\{B + \Delta B\}\} \\ &= [a]^t\{B + \Delta B - [I - a]\{y(0)\}\}\end{aligned}\right\} \quad (12)$$

Since all the elements of $[a]$ are positive, so also will all the elements of any power of it be, and hence if all the elements of the column vector have the same sign, all the elements of $\{\Delta y\}$ will have that sign for all t, *i.e.*, all ys will grow or decline monotonically. In general, there is no reason why the elements of the column vector should all have the same sign and therefore there is no reason to assert monotonicity. This holds even if all the sector injections change in the same direction (all ΔBs with the same sign). If we have the special case of an economy in equilibrium just prior to the shift (*i.e.*,

$$\{y(0)\} - [I - a]^{-1}\{B\} = \{0\}),$$

then

$$\{\Delta y(t)\} = [a]^t\{\Delta B\}$$

with the result that monotonicity depends solely on whether or not all the ΔBs have the same sign.

I should like to emphasise the somewhat unreal character of the problem, which is constructed in deference to the usual habit of analysing the multiplier in terms of a steady level of injections or of a single, unrepeated injection. If this were all the multiplier meant, it would be rather useless, since both cases are most improbable. The proper justification of the method is that in this way we get a response which is characteristic of the economy, and only by superposing a succession of such responses do we get any realistic results. If one analyses an arbitrary time series of injections by means of a series of constant levels subject to (plus and minus) changes, one must remember that it is ordinarily quite unrealistic to assume that the economy was in equilibrium before and that the level continues indefinitely.

The easiest way to approach the reality of a variable rate of injections is to use equation (2) to generate a solution. Taking

the variable injections as $\{b(t)\}$, and $[a]^\circ$ as the unit matrix $[I]$, we have

$$\left.\begin{aligned}
\{y(0)\} &= \{y(0)\} \\
\{y(1)\} &= [a]^\circ\{b(0)\} + [a]^1\{y(0)\} \\
\{y(2)\} &= [a]^\circ\{b(1)\} + [a]^1\{y(1)\} = [a]^\circ\{b(1)\} + \\
&\qquad [a]^1\{[a]^\circ\{b(0)\} + [a]^1\{y(0)\}\} \\
&= [a]^\circ\{b(1)\} + [a]^1\{b(0)\} + [a]^2\{y(0)\} \\
\{y(3)\} &= [a]^\circ\{b(2)\} + [a]^1\{b(1)\} + [a]^2\{b(0)\} + \\
&\qquad [a]^3\{y(0)\} \\
\{y(t+1)\} &= [a]^\circ\{b(t)\} + [a]^1\{b(t-1)\} + \ldots . + \\
&\qquad [a]^t\{b(0)\} + [a]^{t+1}\{y(0)\}
\end{aligned}\right\} \quad (13)$$

or

$$\{y(t+1)\} = \sum_{\tau=0}^{t} [a]^\tau\{b(t-\tau)\} + [a]^{t+1}\{y(0)\} \quad . \quad (13a)$$

The first term of (13a) may be called the convolution of the dynamical structure $[a]$ with the time series $\{b(t)\}$. It can also be called the Faltung or Duhamel sum because it is derived by the pairing of appropriate $[a]$s and $\{b\}$s by " folding " their time series in the middle. Since the system is stable, we may always neglect the second term in (13a) by taking τ large enough.

The solution in the form (13a) tells us that transactions at any time are the result of the previous injections back to the point at which we began reckoning. At that point the injections are replaced by the initial transactions, but these are merely the combined effects of all past injections and are a kind of weighted sum of injections. As with the simple multiplier, we may determine the essential dynamical structure, or weighting functions, by applying a unit impulse of spending to the first sector with zeros for all the others, then a unit impulse to the second sector alone, and so on for all n sectors. Combining all these we may speak of a unit matric impulse $[I]$ which gives rise to the series

$$[a]^\circ, [a]^1, [a]^2, [a]^3, \ldots .$$

Any injections vector will be a linear combination of the n unit injections vectors. The injections distant in time are more completely discounted (given less weight), than are those closer in time. If we identify t with now, we have the backward-looking multiplier, which asserts that receipts now depend on recently past injections. On the other hand, if we identify time zero with now, we have the forward-looking multiplier, which asserts that transactions at any future time t will depend on present outlays and the injections between now and then. In neither case is there any easily observable " multiplier." With either a simple

or a matric multiplier, variable injections are liable to produce oscillations, as the reader may convince himself by trying a random time series of injections. The reason, presumably, in both cases is the Slutsky effect, *i.e.*, the cumulation of random disturbances will produce cycles. Beyond this property common to both, the matrix multiplier has another, which consists of the fact that the transition from one level of activity to another is likely to set up internal or structural vibrations *within* the aggregative system.

In general, it seems to me that Mr. Chipman is more interested in aggregates, whether national income or total transactions, whereas I wished to direct attention to the structural properties of the system. My impression is that general interdependence analysis is more complete and more accurate than national income analysis, and that it contains but is not contained within the latter. Say's Law applied to firms is a useful device of approximation to isolate households and thus avoid the difficulties of general equilibrium, but nothing has convinced me that it has much validity in principle. Naturally, if one semi-isolates a part of the economy, one loses the consequences of interdependence.

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THE PRICING OF MANUFACTURED PRODUCTS

MR. ANDREWS's study of *Manufacturing Business* [1] represents very much more than its title would seem at first glance to imply. It is, in effect, an attempt to re-write the theory of pricing in the light of field inquiries which the author has conducted into the behaviour of manufacturing firms. This field work was made possible by a grant by the late Mr. Samuel Courtauld to Nuffield College, but it had its intellectual origins in the work of the pre-war Oxford Economists' Research Group which was concerned to confront economic theory with economic facts.

Mr. Andrews's results are so diametrically opposed to much recent thinking and writing, and his attempts to construct alternative theories are, to my mind, so powerfully destructive not only of the newer accretions of imperfect competition theory but also of the whole body of economic reasoning that it is of the first importance that they should be subjected to rigid criticism. Since that is the purpose of this review, it is right that it should begin with a word of gratitude to Mr. Andrews. The re-examination of our theories and their reconciliation with the facts is overdue. If he has not said the final word, he has at least forced us to consider the adequacy and degree of over-simplification of much that is being taught to-day.

In a preface, Sir Henry Clay tells us that Mr. Andrews's investigations began with two intensive studies: the first, made possible by Mr. Courtauld, was an examination of the rayon industry; the second, which followed it, was a similarly intensive study of certain branches of the boot and shoe industry. The first, one gathers from Sir Henry Clay, cannot be published because it would be bound to disclose, owing to the small number of firms in the industry, information that is confidential. The second, may, however, be published later. It is immensely to be hoped that it will be. For on the basis of what has hitherto been published it is a remarkable paradox that Mr. Andrews confronts existing theories not with a solid body of opposing and irreconcilable fact but with a ready made alternative set of theories, which may, or may not, be a better explanation of the facts. But of the facts themselves, the book is almost wholly innocent, and a critic is put in the diffi-

[1] *Manufacturing Business.* By P. W. S. ANDREWS. (London: Macmillan, 1949. Pp. xviii + 308. 15*s*.)

cult position of choosing between existing theories and a set of new theories unsupported by any detailed evidence.

Let us begin, then, with the new theories of pricing that Mr. Andrews advances. They may be briefly summarised (following the author, pp. 184 and 204) as follows :

(1) " that the price which a business will normally quote for a particular product will equal the estimated average direct costs *plus* a costing-margin " ;

(2) " that average direct costs will tend to remain at a constant level, whatever the output that is being produced, given the prices of the direct-cost factors of production and ignoring any extraordinary increase in direct costs (due, *e.g.*, to overtime wages being paid for extra output in the short period) " ;

(3) " that the costing-margin will normally tend to cover the costs of the indirect factors of production and provide a normal level of net profit, looking at industry as a whole, and may reflect any general permanent changes in the prices of indirect factors of production, but will remain constant, given the organisation of the individual business, whatever the level of its output " ;

(4) " that given the prices of the direct factors of production, price will tend to remain unchanged, whatever the level of output " ;

(5) " that, at that price, the business will have a more or less clearly defined market and will sell the amount which its customers demand from it, its sales thus equalling its limited share of the market for the kind of goods which it is producing." [1]

Mr. Andrews contrasts the above account of the system with that of " modern economic theory " which has " tended to argue . . . that the rate of profit which a business gets is not even mainly determined by the competition of business men in response to the stimuli of costs and prices. The business man is regarded as having control over his price through his control over his own output, and he is thought to exercise that control and to maintain his profits at their maximum level, by restricting output, regardless of the community's interest in greater production."

I hesitate to describe this account of " modern economics " as a complete caricature. For all I know it may be an accurate

[1] The above is a straight and complete transcript of the summary given by the author on p. 184, with the single exception that I have divided his (1) into (1) and (2), which cover issues which to my mind are essentially separate.

account of the confusions into which, in the hands of second-rate teachers, this branch of theory has now degenerated. But this "modern economic theory," bereft of identifiable parentage, bears not the most superficial resemblance to the theories of imperfect competition with whose Cambridge origins, at least, I have a certain familiarity. First, it was of the essence of those theories that one was dealing with a situation in which entry was assumed to be sufficiently free and competition sufficiently effective to reduce profits to a "normal" level and to ensure that average revenue did not exceed average cost including "normal" profits. Second, it was never assumed as an axiomatic *modus operandi* that prices were maintained by restricting output. It was rather assumed that in a majority of instances the prices of the products of a firm were actually determined by the firm (as Mr. Andrews assumes almost universally in this book), but that the firm had (cf. principle (5), above) "a more or less clearly defined market" in which a price fractionally above minimum average total cost did not automatically imply that the firm's sales were reduced to zero; that the firm was therefore not driven "by the stimuli of costs and prices" to reduce its prices to the level of minimum average cost; that in the esoteric sense that output was less and costs greater than they would be at minimum average total cost there was restriction of output, though in the work-a-day sense of a firm deliberately restricting output below that implicit in the prices it fixed there was no conscious restriction. I will readily grant Mr. Andrews that the practical limitations of block-making have resulted in published diagrams that suggest elasticities of individual-firm-demand and rates of falling costs which are utterly unrealistic in practice and seem to imply the existence and exploitation of immensely greater monopoly powers than I believe the ordinary firm to possess. But this form of analysis was, by intention at least, an analysis of a highly competitive, though not perfectly competitive, situation.

What is important, however, is not the rightness or wrongness of Mr. Andrews's account of those ideas with which he disagrees, but whether or not his account of the basic forces in the pricing system is right and other accounts are fundamentally wrong.

The theories of imperfect competition, as I see them, were a first attempt, building on the foundations of classical economics, to bring into focus the problems of the ultimate decision-making unit—the firm. They did not purport, in the hands of those who developed the ideas first, to describe in detail the ways in which actual firms fixed actual prices. But, they did purport to describe

the underlying economic forces, as they might work out in a world that was highly, but not in the technical sense perfectly, competitive.

Because they were, in this sense, theories of competition they were also theories of probable survival. The more nearly a firm's actions might correspond to the actions supposed, the larger were likely to be its profits, or the less its losses, and the greater its chance of building up reserves, of securing capital with which to expand and of surviving in the face of competition. Thus there was no essential conflict between their short-term and long-term aspects, and the long-term equilibrium grew naturally and automatically out of the shorter-term pursuit of profit.

I stress these aspects of the theories of imperfect competition because Mr. Andrews's account of the pricing system is an account of a ritual. Despite the stress which he repeatedly lays on the competitive nature of industrial enterprise (cf. pp. 172 and 270), he seems to go out of his way to repudiate the idea of firms maximising their profits as an element in the battle for survival (*e.g.*, p. 270). I am sure that I am not misrepresenting Mr. Andrews if I say that throughout the book he regards the ritualistic price-fixing system that he describes as the antithesis of the policy of profit-maximisation. But if one so regards it, what are the consequences? If the ritual is in fact the antithesis of profit-maximisation, then those who least perfectly conform to the ritual have the greatest chance of survival. The wicked nonconformists will triumph; the respectable ritualists will suffer.

A belief in a wholly irrational ritualistic system of pricing is so fundamentally destructive of all the concepts of economics as a competitive evolutionary system, moving always towards the most economic use of resources, that I feel driven to ask whether Mr. Andrews's account of the ritual is a true one. Is the ritual necessarily an irrational one, or is the ritual that he describes a reasonable account of rational action for long-term profit-maximisation in industries possessing certain characteristics? For while I find myself dissenting from Mr. Andrews's interpretations of these actions, I certainly do not dissent from his account of the actions themselves, save in certain minor respects.

May we begin by taking the case of a firm operating in an industry in which the market conditions approximate to those of perfect competition; in which each firm produces a large range of alternative products with the same basic equipment; [1] in which

[1] I find it difficult to understand why, in confronting existing theories with a theory supposedly built on realistic assumptions of the actual world, Mr. Andrews

design and taste are changing all the time; in which the economies of large scale, both short-term and long-term, are negligible; in which competitors can enter the market very quickly.

In such conditions, a firm which wishes to maximise its profits has to consider three chief problems when fixing the price of a new product which it is considering whether to introduce:

(1) At what price could it hope to sell the product?

(2) Could it use its resources more profitably in other forms of activity?

(3) In the light of the above, should it, or should it not, put this product on the market?

The answer to the first question is by no means obvious. If a firm is making an absolutely standard product for an absolutely standard market, the market itself may well provide the answer; a small firm producing cotton yarn may quite reasonably decide not to carry an elaborate costing staff, but to save their salaries, concentrate on technical efficiency and accept market price, as it must do. Alternatively, a firm may, as many of the London drapers do, employ a small staff of spies to find at what price its rivals are selling similar products. But neither of these methods is applicable to a new design that is not yet on the market. In that case, remembering the assumption of nearly perfect competition, two questions arise. First, what is the maximum price which the public would be prepared to pay for an article of this character? Second at what price would competitors be able to put it on the market? It is only if the article can be put on the market at a price that will persuade some buyers to buy that production is at all worth-while. But if that is possible, then the supply price of actual or potential competitors represents the demand price for the initiating firm in all but the very shortest period. If the price-fixing period (in many cases a year) is long relatively to the period of entry of potential competition, the rational action of a firm might be expected to consist in discovering at what price competitors could sell this product, and whether that price would enable customers to be found.

The problem of the best use, in a comparatively short period, of the limited resources of a firm is best regarded theoretically as a problem in discriminating monopoly: How can the firm's resources be divided most profitably between the various products of

(pp. 82 and 253) assumes that the business produces a single product only. In practice there is good reason for thinking that the prevalence of the many-product organisation is an important explanation of the ritual that he describes.

the firm? If the markets are almost perfect, the best simple test will be to ensure that uses which give a smaller margin over the direct costs of factors are not preferred to uses which give a larger margin, except so far as the smaller margin may reflect smaller indirect costs. A rough and ready test is to calculate the direct cost, to add the costing-margin at which the firm's resources will be reasonably fully employed and reject those uses in which the " costs " so calculated exceed the probable selling price.

Both of these entirely rational calculations bear a striking superficial similarity to the ritual of the costing rules. But the actual similarity in practice depends very much on the method by which the " costing-margin " (the addition to be made to direct costs) is determined. As to this, there are discoverable in Mr. Andrews's book two accounts which one may conveniently call the priestly code and the lay code.

The priestly code describes the " costing-margin " [1] as tending to cover the costs of the indirect factors of production and provide for a normal level of net profit. But it is clear that the lay code superimposes on this pure doctrine a substantial element of regard for the market. The costing-margin will vary for the same product between different businesses (p. 159). A firm with high direct costs is likely to be obliged to accept a smaller costing-margin (p. 169). For most established businesses, the net margin is " that which they expect to get on the average " (p. 165). It will differ for different products within the same business (p. 159), not only because of differences of overhead costs involved in their product but also because their markets differ in the extent to which they are liable to the competition of new entrants (p. 178). The costing rules of small competitors will conform to the costing rules of a price leader (p. 182). Special selling costs will have to come out of the margin (p. 187). It will " give the business the highest level of price that it can maintain against competition in the long run, and will be revised downwards at once if the business, in fact, meets competition at a lower level of price " (p. 253).

The view that the costing process is really engaged in discovering the demand price in the market is reinforced by certain other practices. First, Mr. Andrews makes it clear that, " if output falls the business man will not revise his prices so as to charge a higher allowance for average overheads. That would be absurd, as causing the charging of a higher price in a falling market. It

[1] Cf. the summary of the principles of pricing quoted above. See also pp. 159 and 174.

would bring the danger of his market going to competitors" (p. 164). In a depressed industry, even when output is continuously at a low level, the costing rules are likely (p. 165) to assume full normal output, or, if price cutting appears, "an even finer margin." Second, costing rules do not ordinarily take account of abnormal economies or diseconomies due to the firm itself spreading overheads over a larger output or to its production entailing overtime or night work (pp. 109 and 158).

It has been argued above that the costing rules are wholly consistent with an objective of the maximisation of profits on the assumptions that competition is almost perfect and the entry of new competition both free and rapid. Those are conditions which apply pretty generally in the boot and shoe industry, on which Mr. Andrews's generalisations are largely based. But Mr. Andrews is seeking to provide us with generalisations that are applicable to all industry and all price-making. It is therefore relevant to inquire whether the wider extension of his rules can or cannot legitimately be assumed and whether the application of the rules in cases where perfect competition and rapid entry do not exist provide perfect competitive pricing in imperfect competition situations.

It is clear that Mr. Andrews's account of the actions of firms makes them act as if they assume that markets will be lost if price is raised above the potential supply price of competitors. It is far less clear that Mr. Andrews's account would imply infinitely elastic demand curves for individual firms for greater outputs. Indeed, at many points Mr. Andrews appears to go much farther than most of us in suggesting that the elasticity of demand for greater outputs is relatively low.

The market for the individual firm (p. 146) is "a fairly definite group of people." "So long as its price is right, an established business will have a more or less clearly defined market, and will be protected from the efforts of would-be competing businesses to cut into that market" (p. 153). The manufacturer is likely to assume (p. 180) that if he cuts a price, "his rivals will cut their price to protect their own markets when they know that he has cut his." "Price cutting will then normally mean merely a fall in the total receipts of the whole group of competing producers and, since their costs will not be affected, they will be worse off." [1]

[1] Mr. Andrews is here thinking primarily of price cutting to maintain output in conditions of depression. But there is no obvious reason why a manufacturer should make different assumptions about his power to cut prices without invoking retaliation in other circumstances in which lower prices on his part would involve a reduction in the sales of other firms.

Indeed, price-maintenance schemes are (Mr. Andrews holds) in such cases justifiable because " the price-cutting which they seek to prevent is not, in itself, of social value. It leads to a fall in prices, but it also causes a fall in incomes and so increases unemployment . . . in a depression there is no virtue in lower prices as such." [1]

In considering expansion, moreover, the firm will take account of the limits of the factor supplies, and particularly the labour supplies, likely to be available to it. It will remember that very rapid expansion will make it necessary " to bid away workmen who have a preference for remaining where they are already " (p. 225). " It certainly will not act as supposed in the usual theory, continuously increasing its wages as it bids for an expanding labour force." If it starts wage-competition with other employers " the business may be left with a labour force which has expanded only slightly, but for which it has to pay very greatly increased rates of wages. . . . Such a situation bears resemblance to the price-cutting situation discussed in the previous chapter. Its consequences will naturally deter the business man in so far as he can foresee them " (pp. 226–7).

I find it hard to distinguish this balancing of the advantages and disadvantages of price cutting and of expansion from the balancing process which the theories of imperfect competition have assumed. Mr. Andrews makes his business man contemplate price cutting and reject it because it adds, if others cut also, relatively little to his receipts. He makes him contemplate expansion and reject too rapid an expansion because it adds too much to his probable costs. Is not this the exact weighing of alternative scales of output, with their corresponding additions to revenue and additions to cost, which economists have been assuming ?

I think it is right also to ask whether Mr. Andrews is on safe ground in assuming that his principles as set out above apply generally to all branches of industry. A reviewer can do no more than quote an instance where they do not appear to apply in their purer form. I happen myself to have an opportunity of knowing and taking part in the price-fixing operations of a publishing house. In book publishing the crude division into direct and indirect costs is obviously inappropriate. There are : (*a*) costs which are specific to the individual copy of the particular book ; (*b*) costs which are specific to the particular book, but not to the individual

[1] This is surely a remarkable intellectual somersault for a believer in the merits of competition.

copy; (*c*) costs which are general to the business as a whole. This three-fold division of costs is common to a great many firms in a great many industries of a multi-product character; but, in the special case of publishing, costs under the head of (*b*), which include composition, correction, block-making, and all preparatory work for printing off are very large compared with the other costs. A publisher certainly does not assume that his average direct costs of a particular book (defined as (*a*) *plus* a share of (*b*)) are constant for editions of different sizes. Nor does he assume that his pricing of a particular book is rigidly determined by the price at which other publishers might produce books on the same subject by other authors. It is customary to discuss the possible sales at different prices, and the alternative possibilities of breaking even or making a profit with different prices and their corresponding costs. It is normally assumed that a book should not be published (unless it has special qualities to justify it) if it cannot break even and make its proper contribution to general costs. On the other hand, a book that is likely to be successful would not be deliberately priced at a high price; but its price might in retrospect turn out to have been fixed on an assumed sale appreciably smaller than the actual sale (that I take to be the way in which Mr. Andrews assumes that more successful firms make more than normal profits). While in this process some of the elements that Mr. Andrews describes do appear, the balancing of marginal cost and marginal revenue becomes a very nearly conscious part of the process. I believe there are a number of other industries, particularly in the light-engineering field, where a particular product requires particular capital investment in special equipment, tools, jigs and the like, and where there are certain overhead costs of the whole batch of products, such as were long ago described by Adam Smith and Babbage. I would like much more evidence that specific average unit costs are regarded as being constant for different levels of possible planned output. Nor do I feel absolutely convinced that all manufacturers in all industries, other than publishing, regard the potential demand price of their product as wholly independent of their own planned output. Before such generalisations are extended from the two industries which Mr. Andrews has studied to the whole field of industry, we surely need more evidence from a larger range of industries.

In the light of all this I find it hard to sum up my views of Mr. Andrews's work. I think he has done well to remind us that the actual processes of price fixing seldom consciously take the form

assumed in some of the expositions of imperfect competition. But I am very far from convinced that his account of what happens represents an alternative theory. I believe that when one really tries to disentangle what is being done, one comes back to a theory not very different from the existing theories. I believe that everything turns on whether the " costing-margin " is a thing determined by the actual indirect costs of a firm, or is merely an addition to direct costs which reflects the judgment of the firm as to what price the market will bear. I believe that, even if one does not go outside Mr. Andrews's own pages, one can find good reason to think that what the market will bear is a chief element in the process; but that, in assessing that, it is customary, as well as rational, to think in terms not of a very short period, but of a longer period which takes account of the difficulties of price changes as well as of the speed of entry of competition. But I do not think that we have said the last word on any of this, and the mechanism of price change in different industries in shorter and longer periods is a subject which requires a great deal more thought.

But we shall not, I believe, make useful progress by writing down a series of alternative generalisations. What we need most is comparative detailed study of the processes in particular industries with particular frameworks of cost and demand. For my own part I believe that Mr. Andrews could do us no greater service than to publish in full detail his own background studies, and address his further work to the adult intelligences of his colleagues rather than to the layman or the elementary student to whom so much of the present work seems to be directed.

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REVIEWS

Charles Dickens and Early Victorian England. By R. J. Cruikshank. With 64 illustrations in photogravure. (London: Sir Isaac Pitman & Sons, Ltd., 1949. Pp. 308. 20*s*.)

"What was the age of Dickens" . . . "that is the grand testimony of the age of Dickens." These are the first and last words of a book of absorbing interest because of the subject and the author. For what in our youth we thought to be the England of all time has become a period piece and its great novels essential documents of social history: and knowing Mr. Cruikshank from his *Roaring Century* we know to what effect he gets steam up. We must have beside us the *O.E.D.*, *D.N.B.*, perhaps also a "Who's Who in Dickens," if we are to catch every nuance and allusion. It is a positive pleasure to try to catch him out, be it ever so rarely. "The tutelary genius of Georgian agriculture, Coke of Norfolk, was a Whig so implacable that he said to his grandson, 'My boy, whatever you do in life, never trust a Tory. I never have myself, and, by God, I never will'" (p. 120). For "grandson" please to read "son": for he married his ward at sixty-eight, and his son, the Second Earl, 1822–1909, is the little boy of the story. And again "this age of mahogany and ormolu, of triumphant science and mechanical prowess, of fat living, bovine materialism, and the blessed certitude of the five per cents" (p. 229) which five per cents? It can't be Mr. Weller's reduced counsels; and Goulburn in 1844 converted the 3½s to 3s, as Goschen after him the 3s to 2½s. One is entitled to mention the fact, because at the end of the book is a riot of pictorial statistics—population, emigration, revenue and trade. Stick to Facts, Sir! But Sissy gazed in rapture at the reds and blues and green, and especially at the increase of red babies. "I could fancy," she said, . . . "You are not, Cecilia Jupe," Thomas Gradgrind solemnly repeated, "to do anything of the kind."

The age of facts was also the age of steam. "Keeping up the steam! That simile is racy of the period, and it is in the true vein of Pecksniff and Chadband" (p. 109). But why not "vein of Mr. Pancks?" says your reviewer with a steam and a snort . . . "Dear Dickens, and Cruikshank, at least not dear and most assuredly not Dickens, for I have not the pleasure but pray excuse me" . . . Oh, adorable Flora!

The book is in six parts: I. Great Expectations. II. Hard Times. III. Steam and Smoke. IV. The Battle of Life. V. The Haunted Man. VI. Diversions. Its artistry consists in this. For the first half he sees England through the eyes of Dickens and his contemporaries, contrasting its feverish pace and sanctimonious gluttony with the cold and stately insensibility of the eighteenth century. (But was it so cold? What of the Coram in Tattycoram: and when he tells us "there were certainly no such reports brought out then as Dr. Kay's on the health of Manchester or Chadwick's on sanitation" (p. 21), what of Dr. Thomas Perceval 1740–1804 and the Manchester Board of Health of that day?). Of all the tributes to Dickens as a social reformer I like best that of Shaftesbury quoted on p. 178, "God gave him a general retainer against all suffering and oppression." Chapters on religion and Victorian Sundays (Arthur Clennam's early Victorian Sunday, merging into Samuel Butler's mid-Victorian Sundays), and on Darwin and the Age of Science link the first half of the book to the second, where, in Mrs. Jarley's words, "We come to the General Public and they want stimulating." Here Mr. Cruikshank excels. In the company of Vincent Crummles, he acts Dickens, and a second David Copperfield recalls the thrills and pains of his own youth, with the contrast between then and now. He delights in music and fireworks, in the horse-riding and balloon flights, recalled amid the desolation of a London blitzed by the Second World War, yet nevertheless still going strong. "When all is said and done, when the account is struck, all that matters is the staunch heart of a people, its flow of creative ideas, its capacity to set free its own energies and its faith in itself. That is the grand testimony of the age of Dickens."

C. R. FAY

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The Keynesian Revolution. By LAWRENCE R. KLEIN. (London: Macmillan, 1950. Pp. xii + 218. 15*s*).

The Economics of John Maynard Keynes. The Theory of a Monetary Economy. By DUDLEY DILLARD. (London: Crosby Lockwood, 1948. Pp. xv + 364. 18*s*.)

THESE are both English editions of books published earlier in the United States. Both of them will already be familiar to many English readers.

Dr. Klein's well-written and closely reasoned essay has a mixed audience in view; some sections are addressed mainly to professional economists, but it is hoped that the general argument

will be intelligible to a broader public. He opens with two chapters on the development of Keynes's thought up to 1936, including a useful analysis of the " fundamental equations " of the *Treatise on Money*. He then goes on to give at a fairly sophisticated level a broad survey of the *General Theory* and its relationship to " classical " writings. Despite certain inaccuracies noted below, this chapter is a fine piece of work, which should be particularly useful as revision reading to the student. The chapter which follows, a more detailed treatment of a number of controversial issues, is less successful. The savings–investment controversy is well and clearly disposed of, but the discussions of the wage question and of interest theory carry less conviction, the vehemence with which the conclusions are reiterated inspiring suspicion rather than confidence. Dr. Klein is very reluctant to concede that the loanable-funds approach to the theory of the rate of interest can be reconciled with liquidity-reference, and insists that stocks, not flows, are the appropriate concepts to work with. This is surely no more than a matter of convenience. It is true, as he argues, that a Wicksteedian approach is particularly suitable, when, as in the case of the security market, the function of the price-mechanism is mainly, if not entirely, to re-allocate existing stocks rather than to dispose of new supplies. But to say that, where stock-holdings are large, a flow analysis actually involves faulty logic is quite a different assertion, and an untrue one. The remaining chapters deal in turn with anticipations of Keynesian theory by earlier writers—mostly on the lines of Chapter 23 of the *General Theory*, but including an interesting section on Marx, with the application of the principle of effective demand to inflationary situations; and with social and political implications. In conclusion, there is a substantial mathematical appendix, concerned in part with proving that the Keynesian conclusions necessarily follow, under certain realistic assumptions, from the supposition of profit and utility maximisation; and in part with contrasting Keynesian and other models along lines now broadly familiar.

Dr. Klein's viewpoint is Keynesian in the rather narrow, American, sense of the term, with a pronounced leaning to the left. The argument throughout is conducted with a lucidity and vigour of a very high order, and the author has interesting things to say on every page. The standard of accuracy is high but not quite above criticism, though there are not many passages where the reader is likely to be seriously misled. Two examples of apparent errors may be mentioned. In the diagram on p. 88

the dotted line should be to the right of that running parallel to it, not below; this mistake unnecessarily weakens the case being argued. On p. 70 the reader can hardly be expected to swallow the assertion that, because the value of the stock of wealth is equal to the flow of income capitalised, it makes no difference whether we say that the rate of interest is a function of the total quantity of assets owned or a function of the level of income!

Despite its many merits, *The Keynesian Revolution* is a little disappointing in some more general respects. Pains have evidently been taken to counter the detailed criticism which Keynesian economics have encountered, but in a book published over ten years after the birth of the General Theory rather more attempt might have been expected to deal with the large issues which Keynes left virtually untouched. The most obvious deficiency is in the treatment of those long-term problems of economic progress that are bound up with the nature and volume of investment. Various determinants of investment are mentioned, but in many passages Dr. Klein is content to speak of the volume of investment as "autonomous"—in other words to admit that the theory as expounded is incomplete. Had more attention been paid to these and cognate topics, the impression might have been avoided of a certain complacency about the state of our present theoretical structures that does disservice to their main architect.

The second book under review is purely didactic in purpose. The author modestly states that he lays no claim to originality of treatment except in "the self-conscious manner in which I have attempted to explain the . . . theory by linking it to the policies which Keynes advocated" (p. ix), and in the emphasis laid on the importance of contemporary events in moulding Keynes's thought. This pragmatic approach is further developed in the final chapter, which is the most interesting and original part of the book.

In many ways Professor Dillard's book is an able one, but its self-imposed limitations seriously reduce its value. The book is neither an introduction to the *General Theory*—for it aims at thorough coverage and its length is considerable—nor is it a critical companion, for although an excellent and up-to-date bibliography is attached to each chapter, no attempt is made in the text to depart from the letter of Keynesian doctrine except in so far as it was modified or developed in Keynes's own writings after 1936. *The Economics of John Maynard Keynes* appears therefore to be intended as a substitute for the *General Theory*

for the benefit of the student or layman who finds the original work too difficult. The order of presentation is the same as Keynes's, and Professor Dillard must at times have been hard put to it to avoid copying out whole paragraphs. Now it may well be doubted if such a close and dogmatic adherence to the original text is really the most beneficial approach for the sort of reader mentioned. The confusion that reigned even in professional circles in the first few years after the publication of the *General Theory* is sufficient evidence that its manner of presentation was misleading in important respects. But Professor Dillard will make no concessions. Thus we are told that the rate of interest determines the marginal efficiency of capital and not vice versa and that this is a " very important point " (p. 197); the admission that the multiplier process takes time is made grudgingly and at a late stage in the argument, and so on.

Professor Dillard is particularly anxious to show that the different elements in the theory hang together in such a way that certain fundamental ideas are relevant at every stage of the argument. But sometimes this in many ways laudable desire gets pushed too far. It is clearly an error, arising out of a confusion of the individual's situation with that of the nation, to argue, as he does, that where there are unused resources interest cannot be considered the reward for not-spending, on the grounds that it is possible to increase consumption without any reduction in savings. Nor is it true that liquidity-preference would necessarily be absent in a static economy, unless that concept is extremely narrowly defined. One result of Professor Dillard's somewhat monolithic attitude is that the reader is left with the impression that on each point where there is a difference between Keynes and " the classics " the latter were guilty of half a dozen separate and independent blunders. Experience suggests that this is not conducive to clarity in the mind of the beginner.

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Chance and Choice by Cardpack and Chessboard. Vol. I. By L. HOGBEN. (London : Max Parrish, 1950. Pp. 417. 50*s*.)

THIS text-book of statistical theory employs unusual methods of presentation in accordance with the vigorous views set out in the author's foreword. He points out that " less than 1 per cent.

of research workers clearly apprehend the rationale of statistical techniques they commonly invoke " and that " the experts themselves disagree on fundamental issues : . . . One therefore hopes that an attempt to present the elements of statistical theory by exploiting a new educational technique will commend itself. . . ." The book is intended for students who have covered the higher school-leaving syllabus in mathematics, and whilst avoiding issues of rigour always offers a rationale—*i.e.*, a vague proof of validity —for the statistical methods advocated.

The result so far of this attempt at a highly original book is a first volume of over 400 pages covering the following ground. Chapter I : Miscellaneous Mathematical Theorems. Chapter II : The Meaning of Probability in Terms of Equally Likely Alternatives. Chapter III : The Binomial and Multinomial Distributions and the Poisson Approximations to the Binomial. Chapters IV to V : Significance Tests for the Difference between Two Proportions and Confidence Intervals for Proportions. Chapter VI : The Method of Moments. Chapter VII : Significance Tests for the Difference between Two Sample Means, including the *t*-test. Chapter VIII : Spearman's Index of Rank Correlation, and Instructions on Computing a Correlation Coefficient. Chapter IX : Linear Regression Illustrated by Games of Chance. The Partial Correlation Coefficient. Chapter X : The Balance Sheet Aspect of the Analysis of Variance.

This is admittedly a condensed account of the contents; but the fact remains that in over 400 pages, a very modest range of subjects is covered. The main explanation is that the exhaustive discussion of all the possibilities in various games with dice, cards and dominoes uses up a lot of space, especially when copiously illustrated by beautifully drawn, but most involved diagrams. Another reason is that certain topics such as the logic of significance tests are rightly dealt with at some length. Again, in the avoiding of mathematical elegance and " refined devices " the author sometimes veers towards the opposite extreme.

By contrast with the clear diagrams in *Mathematics for the Million*, many of the diagrams in this volume seem decidedly confusing, and it is difficult to believe that a high proportion of readers will be helped by such illustrations as Figs. 70–71 illustrating the " derivation of the mean-score distribution for the 3-fold toss of the tetrahedral die."

The mathematics in the first chapter, although not " advanced " are sufficiently difficult to invite the question whether a pupil capable of struggling through it would not be

wiser to invest his time in the study of one of the more "advanced" text-books such as those by Professors H. Cramer, M. G. Kendall and A. Mood.

The most valuable part of the whole volume is contained in the discussion of fundamental ideas at the end of Chapter II and at the beginnings of Chapters III and V. Here, however, one is left puzzled by such a phrase as "One school prefers to identify the concept of probability exclusively with the frequency of external events. Another defines it exclusively with the frequency of correct judgements about them." The important dichotomy is surely between those who define probability in terms of frequency and those who define it in terms of reasonable degrees of belief. If the latter assert that the probability that there is life on the moon is greater than 0 but less than 0·5, they do assert that it is reasonable, while admitting the bare possibility of there being life on the moon, to believe, rather, that there is no life there. They do not assert that a judgment that there is life on the moon will sometimes be correct but not as often as five times out of ten.

Another page of this book which is well worth reading is page 179, where attention is drawn to the distinction between a finished mathematical proof and the hit-and-miss activities by which a theorem is originally discovered. It may well be that students could be spared needless discouragement if they were told more of the kind of reasons which lead one to expect a theorem to be true before they are confronted with the sophisticated and elegant proof which clinches the matter.

In one or two sections of the book there seem to be definite opportunities for improvement. On page 213 the explanation given of the "customary" distinction between confidence intervals and fiducial intervals, is so unorthodox as to be positively misleading. On page 136, the proof of the Poisson approximation to the Binomial distribution appeals quite unnecessarily to Stirling's Theorem, and a page is covered by what need occupy only a few lines.

Any attempt to apply new techniques to the teaching of statistics deserves a welcome, and it will be interesting to discover what type of student finds this book to his taste. The chief qualities required seem to be a powerful visual memory, intense curiosity and ingenuity, and immense capacity for taking pains.

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An Introduction to the Theory of Statistics. Fourteenth Edition Revised and Enlarged. By G. UDNY YULE and M. G. KENDALL. (London: Griffin, 1950. Pp. xxiv + 701. 34*s.*)

ECONOMISTS with statistical leanings will welcome with interest the appearance of this new edition of Mr. Yule's and Professor Kendall's classic work. The serious mathematician and the layman are both reasonably well served by existing statistical literature, but in contrast, the amateur of some but limited accomplishment finds few texts suited either to his taste or to his attainments. Mr. Yule and Professor Kendall have always tried to provide suitable nourishment for the presumably large numbers of people of moderate mathematical ability, but in fact their book is suitable for students with a rare and somewhat improbable combination of knowledge and ignorance. It is very doubtful whether many aspiring statisticians, equipped with the necessary mastery of algebra and of analytical geometry (not to mention determinants !) required to cope intelligently with this book, are at the same time entirely unacquainted with the calculus. Nor is it true that, because basic ideas in algebra are in general simpler than those in calculus, all algebra is necessarily easier than all calculus. A judicious and restrained use of calculus accompanied by some simplification of the algebra would do much to clarify some of the arguments in this book.

In the choice of subject matter, the book has also taken a middle course in previous editions. Very little indeed has been said about the foundations of statistical theory in the theory of probability and not a great deal more about the more practical aspect of a statistician's work other than computation. Professor Kendall's latest revision has gone a certain way in remedying the latter defect but no distance at all in respect of the former. There is still no more than occasional passing reference to the theory of estimation. Professor Kendall's main effort has, however, been directed to bringing the original treatment of the subject up to date.

The Theory of Attributes, which previously took up the whole of the first five chapters has now been compressed into three, but there are many people who will not be satisfied until this process has been carried a good deal farther. The chapter on the practical problems of correlation has been re-written and contains much of very great interest to economic statisticians dealing briefly, as it does, with the effects of grouping on correlation coefficients, nonsense correlations, the variate difference method and economy in the use of variables. In connection with the last-named

problem, there is a brief mention of Confluence Analysis, but all reference to the main function of this analysis, that is to detect when the intercorrelation of the variables is making the estimates of the regression coefficients unreliable, is omitted.

The treatment of Analysis of Variance has been expanded to a full chapter, but for some reason Professor Kendall has only thought it necessary to give a brief explanation of the arithmetic required for this kind of analysis. This omission is inconsistent with the extended treatment given in other parts of the book, and is particularly unfortunate in that it is a subject which invariably causes difficulty to beginners.

The new chapter on the problems of practical sampling is especially welcome, and there is much interesting discussion of the different sources of bias. However, the theoretical parts of this chapter seem to be rather difficult for a novice, and the paragraph dealing with sampling fractions is a good example of the failure of an expository technique, which includes moderately advanced algebra but no calculus amongst its tools. The addition of a whole chapter dealing with Index Numbers ought to gratify economists, and in intention at least it remedies a notable deficiency. Nevertheless, the subject is an awkward one because it lies athwart the nebulous boundary between economics and statistics. Sadly enough Professor Kendall has tried to deal with the problem solely from a statistical standpoint, and students who read this chapter will merely get the idea that an Index Number is just "a sort of average." Perhaps in some later revision Professor Kendall will treat this very important topic more along the lines employed by the late Lord Keynes in his *Treatise on Money*. It is surprising, too, that no mention is made of the useful fact that a base-weighted price index multiplied by a current-weighted quantity index is equal to an index of value.

At the end of the book two chapters on Time Series have been added, and these fill the long-felt need for an elementary exposition of this subject. The first chapter deals in the main with the descriptive problem, and may be criticised on the ground that trend elimination by using moving averages is given an unnecessarily elaborate treatment while there is only a very short single paragraph on the elimination of seasonal movements. The discussion on the possible effects of trend elimination on the behaviour of what is left over should be read by all economists with a penchant for dabbling with "trend-free" time series.

Finally, in the chapter dealing with the theory of short-term

and random components of time series, Professor Kendall gives skilful compression of a difficult subject in which he himself has done much pioneer work. Few people will cavil at his short discussions of the problems of periodogram and correlogram analysis.

In the rest of the text, Professor Kendall has made various additions "to keep . . . abreast of modern discoveries." Under this head fall such things as Gini's coefficient of mean difference, the rank correlation coefficient known as Kendall's τ and problems arising from errors of observation, while Snedecor's F has been called in to supplement Fisher's z test. Professor Kendall has also carried out other small acts of modernisation. The "semi-invariants" have become "cumulants"; "universe" has been replaced by "population"; and the "workhouse" has given way to the more socially non-committal "institution." The more usual summation sign Σ has replaced S throughout.

The critical remarks made here relate in the main to details, and should not be allowed to obscure the value of Professor Kendall's attempt to adapt still further to present-day needs Mr. Yule's earlier work. However, everyone with the best interests of both economics and statistics at heart would surely agree that it was never more important than now that undergraduate economists (*inter alios*) of moderate mathematical skill should be actively encouraged to pursue the theory and practice of statistics as far as is humanly possible. The text-book that enables them to do this has yet to be written. To be successful such a work will have to make many more concessions to the known mathematical limitations of its prospective readers than Professor Kendall has been prepared to do so far. It is to be hoped that he will undertake this worthwhile task in the not too distant future.

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Production and Welfare of Agriculture. By Theodore W. Schultz. (New York and London: The Macmillan Company, 1950. Pp. vii + 225.)

In his Preface Professor Schultz describes the purpose of this series of studies to be to untangle the economic strands of American agricultural policy since the First World War, to make explicit its objectives and re-examine their meaning and to suggest, generally in outline form, alternative policies. The book is very definitely a series of studies rather than an integrated volume, as

was his earlier *Agriculture in an Unstable Economy*. For this reason, and because he covers in a rather short space a very large number of subjects, necessarily touched on briefly, I found it less valuable than the earlier work. A number of interesting ideas are suggested; but they are not sufficiently worked out to do much more than indicate the general line Professor Schultz takes on current policy and problems. For someone like Professor Schultz even this is, of course, valuable. But I should myself have preferred to see some of his points worked out in more detail, even if this had meant omitting others.

Professor Schultz still holds to the view, cogently put forward in *Agriculture in an Unstable Economy*, that agriculture is, and will remain, a declining industry, in the sense that less man-power will be required in it. But not less capital; because of various natural and institutional difficulties which he outlines, mainly associated with risk, the capital available to farmers is rationed by factors partly distinct from its marginal productivity and cost, and its marginal productivity is low. More capital is needed, as one of the means to overcome what he considers to be the inefficiency of American farming. He also argues (mainly in Chapter 10) that agriculture requires more economic administration by Government; and a large part of these studies is devoted to considering what form this should take.

His main theme is the importance of separating two objectives, the optimum allocation of resources, designed to secure efficiency in production, and a redistribution of personal incomes, designed to secure greater equality. If price and production adjustments are used, as they were under the A.A.A. in the inter-war years, in order to protect farmers' incomes when these fall too low, then not only will benefits go to those who do not need them as well as to those who do, but also resources will, as a consequence, be maldistributed. This is not new; but in several places it is very well put.

Professor Schultz, designedly, devotes his main attention to the first problem. He does no more than throw out hints how the second is to be solved; in particular, he scarcely discusses the difficulty of separating out the two objectives. His solution to the first problem remains that of announcing forward prices to farmers designed to attract resources to the places where they are needed, of allowing the market to determine consumers' prices, and bridging any gap with subsidies (or levies?). In addition, returns to farmers should be kept up if general effective demand falls off. In the light of this policy he criticises not only the

existing parity policy, but also the Brannan plan and other aspects of policy.

These are only a few of the topics touched on. It is impossible, in a review, even to indicate all the contents of such a very compressed book.

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The Economics of Public Finance. By PHILIP E. TAYLOR. (New York: The Macmillan Company, 1948. Pp. xxiv + 618. $4.50.)

Public Finance and National Income. By HAROLD M. SOMERS. (Philadelphia: The Blakiston Company, 1949. Pp. xii + 540. $5.00.)

IT is a practice among critics of gramophone records to compare the records upon which they are commenting with previous recordings of the same work, and there is much to be said for reviewers of text-books following a like course. Here also, the score is, roughly speaking, the same for all, and here also, therefore, the task of the reviewer is mainly to comment on the interpretations offered, as a whole and in respect of particular passages, and to draw attention to technical excellencies and deficiencies. What the reader wants to know is which, among the available alternatives, he should choose—often, whether a new performance is worth acquiring, given the one he has got.

The present reviewer's opinion is that neither of these works is as satisfactory as the *Economics of Public Finance*, by the late E. D. Allen and Professor O. H. Brownlee, which was the first text-book of what we ought, perhaps, to call "the New Public Finance" to come from the New World. Professor Taylor's is a stock performance: not much is left out, but motive force is lacking, there are no high-lights and much is blurred. Professor Somers is at the other extreme: his technique is first class, to a number of themes he brings fresh illumination, but the result is a collection of separate essays rather than a text-book of public finance. Advanced students can profit greatly from it, but as an introduction to the subject it is frightening.

The mark (of doubtful historicity) which distinguishes the "new" from the "old" public finance is, of course, the application of a theory of aggregates to government finance and government policy. In this country the third edition of Professor Pigou's *Study in Public Finance* has been given additional chapters

on this subject, and Part III of Mrs. Hicks' Cambridge handbook deals with it. But it has been left to the Americans to put it in the forefront of their courses. Can this be done successfully, and if so, how? There are two serious obstacles. First, public finance is applied economics, but aggregate analysis being still a much-debated subject, there is the constant risk, throughout the dynamic parts of one's book, of losing the confidence of the reader in the economics that one is applying. Secondly, and again reflecting theoretical problems, there is difficulty in bringing the dynamic analysis of budgetary and debt policy and the static analysis of tax incidence and income distribution into a single, integrated structure. Messrs. Allen and Brownlee's way round these difficulties was to take a definitely normative view of their subject: the object of public finance was to serve public policy, which, for them, meant full employment, equity in the distribution of income and an optimum distribution of productive resources—or, in the terms of Mr. Crowther's *Economics for Democrats*, regularity, equality and efficiency. This method of approach immediately reduced the size of the second obstacle, since it is notoriously easier to prescribe what kind of budgetary policies should be followed in given circumstances than it is to analyse out the quantitative effects of individual measures. Also, their method provided them with a static analysis of expenditure to accompany that of taxation and so, with the added doctrine that flexibility in taxation is to be preferred to manipulations of expenditure for stabilising employment, a reasonable unity of subject-matter and analytical method was achieved. Both Professor Taylor and Professor Somers, however, have denied themselves this way of escape from their difficulties by taking up positive rather than normative attitudes to their subject. Professor Taylor does, in fact, shift his ground occasionally, but Professor Somers maintains an austere viewpoint throughout:

> "Government finance may be visualised as a powerful force which strikes the economy with considerable impact and spreads its effects through every sphere of production and consumption. It is difficult to visualise the magnitude of this impact. One method of approaching the problem is to follow through the points of contact of each instrument of government finance. A detailed consideration of these points of contact is the subject of this book as a whole" (p. 3).

Each author tackles the obstacles noted in his own characteristic fashion, but neither successfully overcomes them. In the choice of aggregate analysis, Professor Taylor draws heavily

upon Hansen, using a simple, linear "leverage coefficient" embracing both multiplier and acceleration principle, without much indication that thereby many things have been left unsaid. Few students who have read any trade-cycle theory will get very far here without feeling dissatisfi[illegible]asy. Professor Somers, by contrast, provides a brilliant survey of contemporary trade-cycle theory, fully documented, with multipliers (six of them), acceleration principle, Ricardo effect and the rest. But while this will surely prove of the greatest use to the trade-cycle specialist, it seems to be of very limited worth for the practical matters in hand, and is altogether too much for the general student, who wants only the main essentials. Thus, neither author provides in this field that kind of finished answer, satisfactory to the expert yet simple enough for the tyro, which a good text-book in applied economics demands.

Fault is likewise to be found with both authors regarding the general architecture of their books. Both break up their central material into its technical divisions of taxation, expenditure and debt. Both then appropriate the analysis of aggregates to "expenditure," leaving resource-allocation and income-distribution to "taxation," and "debt" something of a rag-bag (Professor Taylor's rather the better). This is unsatisfactory. It is true that, by this device, an amount of space can at last be given to expenditure comparable to that which has always been allotted to taxation; but the division depends on a false simplification. Data and type of analysis do not pair off in this easy fashion. To each type of government activity both price and aggregate theory must be applied: the same tax or item of expenditure which alters the savings–investment gap also affects the profits and losses of particular firms and industries and the net incomes of different individuals and classes. For each level of analytical investigation and in respect of each class of political objective, all three constituents of a public finance system, taxation, expenditure and debt, must be looked into.

Now, in the case of aggregate analysis applied to employment policy, both authors do, in fact, recognise this. After dealing with the subject at length under the head of expenditure, each raises it again in his sections on taxation and debt, and each feels obliged, before the end of his book, to take it up once more under the unified head of "budgetary policy"—Professor Somers producing a valuable survey of recent literature in the process. But the other elements in public finance, namely, income-distribution and resource-allocation, are not explored in this fashion. True,

Professor Somers undertakes an exhaustive, and in some respects novel, inquiry into tax incidence, but it is not very closely connected with the other parts of his book, and the rest of his " old " public finance is a collection of more or less independent departments. The same may be said of Professor Taylor.

It is right that the " new public finance " should not just be tacked on to the older matter, but both these authors, it seems, are disposed to go to the opposite extreme. They would let it dominate their whole approaches to the subject. Other concerns, such as the reform of the tax system and the rights and wrongs of social insurance or consumer-subsidies, though they must be commented upon in a text-book, are left more or less in the air. Of course, such a single-minded attitude yields an integrated system of sorts. But it is not the integrated system upon which a pure theory of public finance would insist; and, on a severely practical plane, while it might be held to be appropriate to present-day issues in the United States, it certainly does not fit the whole of the current problem of the United Kingdom. In this country, as we have somewhat painfully discovered, the new purposes (and effects) of public finance do not oust the old. The art is in combining both, and the student ought not to be allowed to forget this.

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Taxes and Economic Incentives. By LEWIS H. KIMMEL. (Washington, D.C.: The Brookings Institution, 1950. Pp. 217 + x. $2·50.)

THE object of this book is to discuss the effects of the main taxes levied in the United States on the supply of enterprise, capital and labour. Separate chapters are devoted to the Corporate Income tax, Personal Income taxes, Sales and Excise taxes, Property taxes and Payroll or Employment taxes. The concept of taxable capacity is discussed at some length, and suggestions are also made for rationalising the United States tax structure by such measures as dovetailing the Corporate and Personal Income taxes and tidying up some of the more anomalous provisions of the Capital Gains tax.

Some of this discussion is extremely useful. It is particularly refreshing to see the outlines of the American tax system clearly without having to search through the usual fat tome. The author's treatment of incidence is succinct, and yet he does list most of the pros and cons on such thorny topics as the shifting of the Corporate Income tax.

But in its main purpose " to appraise the principal taxes now employed from the standpoint of their effects on economic incentives " the book cannot be judged successful. By leaning heavily on a questionnaire sent out to 1,000 business-men about the effects of various taxes on incentives, the author lays himself open to two major charges. The first is that he produces no evidence at all about the sampling properties of the inquiry. It *may* be that the 1,000 business-men questioned were selected by correct techniques of stratified sampling, and it *may* be that the 200-odd who replied were a microcosm of the 800 who did not—but not a word is breathed about such points. Secondly, even if we are prepared to accept the statistical techniques without flinching, it is surely naïve to take the replies as they stand. How can the business-man possibly know whether State Sales taxes (p. 136), rather than the host of other possible factors, have cut down his sales? How much reliance can we put on the business-man's own analysis of his motivations? There is surely a strong presumption that he will answer what he thinks he is expected to answer, possibly based on some dim recollection of what he learned at the Harvard Business School twenty years ago. And is it so malicious to suggest that, if he knows that answers to questionnaires from the Brookings Institution have a way of appearing in books and publications of various sorts, he may be tempted to use this free method of influencing public opinion about the inadequacy of depreciation allowances (p. 51). In short, the answers to a questionnaire of this sort may throw little or no light on the motivations of past or future courses of action.

In the more theoretical parts of the book, there are a few peculiar omissions. Chapter I on " Taxable Capacity " harks back to the sort of arguments produced by Lord Stamp and others in the 1920s, but does not mention Colin Clark's empirical investigation into taxation/National Income ratios, published in this JOURNAL a few years ago. Nor is it easy to see why the maximum tax/National Income ratio is necessarily higher in a rich than a poor country once the importance of the purely transfer nature of much government revenue and expenditure is fully recognised. A valid argument might be that in poor countries social services and transfer payments are not usually highly developed, and therefore people are not used to more than a small proportion of income being paid over to the Government—but this is not brought forward in the text. Then the discussion of depreciation allowances and inventory valuations for tax purposes is very superficial. The conventional journalistic arguments

about the inadequacy of tax allowances in times of rising prices are all produced, but there is no attempt to separate the wheat from the chaff by considering, for instance, the high rate of net investment in the post-war period and the consequential large additions to accumulated depreciation funds.

Nevertheless, despite these omissions, the book may be found useful by readers as a quick summary of the present state of tax regulations and rates in the United States.

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The Cost of Distribution of Consumption Goods in Australia and Elsewhere. By S. J. LENGYEL and R. M. BEECROFT. (University of Melbourne (London: Wadley & Ginn), 1949. Pp. vi + 184. 35*s*.

IN 1946 the University of Melbourne planned a series of publications dealing with the economics of distribution. The first of the series was the pamphlet *Problems of Distribution in Australia*, which dealt generally with the need for a Census of Distribution. This is the second publication, and here an attempt has been made to assemble the facts which will, the authors hope, be used as a basis of a third publication outlining a policy on distribution. The Faculty of Economics and Commerce of the University deserves every credit for encouraging research in this most complex and important sector of our economic life, and Messrs Lengyel and Beecroft have here provided us with a useful addition to the small library on this subject.

In the first part of the book the authors discuss the problems, methods and costs of distribution, illustrating where possible from experience and data in Australia, the United Kingdom, the United States, Canada, South Africa and occasionally European countries. The second part of the book consists of studies of the costs of distribution of some twenty main groups of consumer goods. The costs considered are those of wholesalers and retailers giving where possible both mark-ups and operating costs, and in each instance presenting roughly comparable information from up to six countries alongside the data relating to Australia. War-time price-control orders in the different countries have been used as the main source, and these have been supplemented by published data from cost and census investigations in different parts of the world such as the returns of the Retail Distributors

Association in the United Kingdom, Dun and Bradstreet's surveys in the United States and the Canadian Census of Merchandising Establishments. Some hitherto unpublished information based on the experience of Australian wholesalers and retailers is also presented, though unfortunately no indication is given of the nature of the samples taken. The years covered, for the most part, are 1939–45, using earlier data where available and relevant.

The collection of this material from so many varied and, in some instances, unco-operative sources is evidence of the initiative, extensive research and knowledge of the authors, but the final result must be described as rather unsatisfactory. It is true, as Professor G. L. Wood suggests, in his Introduction, that research in distribution, like mining and exploration, is both exciting and frustrating. Every student of the subject knows these feelings, but in this instance the authors and publishers must be held responsible for part of the frustration experienced when reading the book.

The attempt to cover in 25,000 words in the first part of the volume practically the whole gamut of distributive questions from black markets to basing-point systems, from voluntary wholesale groups to fallacies of percentage margins, results, almost inevitably, in disjointedness and oversimplification. While certain sections, for example that on manufacturer's marketing functions, are well argued and show a very sound grasp of the pitfalls of the subject, other sections, often containing quotations and tables, are either misleading or so concentrated as to convey little to the reader. The "excitement," for example, of reading and studying the section giving information and tables of the increase in employment in the distributive trades in different countries turns rapidly to frustration when after only three short pages and with a number of questions in one's mind about the comparability of the figures the reader turning the page finds himself plunged into a 500-word discussion of restraint of trade. The complications of the subject and the inherent value of the research done deserved a smaller canvas and less-hurried writing.

The second part of the volume is narrower in scope, and the studies read interestingly. But again more care in distinguishing clearly between the evidence from different countries and in giving in every case the operative dates of the various price orders would have greatly enhanced the value of the volume as a source book.

Finally, reference must be made to the production of the volume. To speed up publication photographed typescript has

been used without, apparently, any proof reading whatsoever. A casual count has shown over fifty obvious errors in the text, including some of figures and references. When figures and extracts and tables from other publications form such an important part of the study such carelessness is almost inexcusable. Certainly students wishing to use the data must be advised to check with the original sources.

J. B. JEFFERYS
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Management Research in Retailing. By H. PASDERMADJIAN. (The International Association of Department Stores. (London: Newman Books), 1950. Pp. xii + 177. 16*s*.)

THE activities of the International Association of Department Stores—a society for management research—are little known in this country, and this volume by the Secretary of the Association is of value in going some way towards filling this gap.

The Association, founded in 1928, was one of the many scientific management research groups of both national and international flavour which sprang up in Europe in the somewhat hot-house conditions of the middle and late twenties. The best known of these was the International Management Institute of Geneva. But in the stormy economic and political climate of the thirties acts of faith—and Dr. Pasdermadjian suggests that any initiation of research implies an act of faith—were rare, and the International Association of Department Stores is practically the only body that has a record of continuing membership and activity since the optimistic days of the twenties.

The reasons for this success are many. One factor was the relatively limited scope of the Association. In twenty years' history the maximum number of members has been ten and the minimum, at foundation, four. At present the membership numbers eight, drawn from that number of European countries. No British store is now a member, though both Messrs. Schoolbred and Harrods have been associated with the work. The smallness of numbers arises from the deliberate policy of restricting membership to one store from each country, in the belief that the essential frankness and openness could be secured only if no direct competition existed between the firms. But without delving further it is obvious that the success of the Association was primarily due to the fact that it fulfilled a need and assisted member firms to operate more efficiently and profitably.

An appreciation of this is gained from the interesting description of the method of operation of the Association. Bi-annual meetings of top executives were followed, as confidence in the Association grew, by meetings of research managers, controllers, merchandising, sales promotion, store and personnel managers. Particularly important and instructive were the so-called critical store visits, when the chief executives of all the member firms visit one of the firms and make an on-the-spot investigation lasting several days with the object of offering suggestions to the firm as well as learning themselves. Regular statistical exchanges, and with them the hammering out of standards of comparison, have been a major activity, and in this connection the list of physical operating standards and financial operating standards given on pp. 38–9 is of considerable interest and value.

Less satisfactory from the angle of judging the actual success of the Association is the account of the work done. A considerable section is devoted to a discussion of the general principles of scientific management and of the improved methods of organisation introduced by member firms. This discussion is far more readable and realistic than most outlines of the subject, though even here we get a measure of the usual pontifical quotations, jargon and mumbo-jumbo about functions, sub-functions, co-ordinate contacts and such like cheek by jowl with detailed suggestions which make the reader think he has stupidly missed some hidden problem. On page 101, for example, we are solemnly told :

> "The daily number of visitors is easily determined by having a recording meter at each entrance. The total number of visitors in the store can be obtained by posting at each entrance an additional checker, recording the number of visitors leaving the store. At any given time the difference between the totals of the observers recording the entrances and the totals of those recording the exits gives the total number of customers who are in the store."

These irritations would be of minor significance if the reader was told what happened next and was given facts and figures; if he were told exactly what effect the introduction of functionalisation had on the buying and selling policy and on the results of a firm, or, after a check has been made on the numbers in a store, to what specific use and with what results was the information put by different stores at different times. The answers to these and the many other questions that arise no doubt lie in the archives of the firms or at the Association office, but a great opportunity would

appear to have been lost of going beyond generalisations on scientific management to a detailed assessment of the results of the use of different techniques and programmes in varied settings. The historian and the economist will also regret that no indication is given of what twenty years of changing economic conditions have meant in terms of organising, capital, merchandising and labour policy (though there is a revealing hint that less attention was paid to scientific management principles during the recent sellers market (p. 81)) or whether the experience of the Association provides any answer to the suggestion that department stores have reached the limit of their expansion.

The need for secrecy regarding actual trading practices and results and the smallness of the sample may have precluded the author from attempting these tasks. And within the limits indicated Dr. Pasdermadjian has given us a most useful and readable handbook on scientific management in retailing and on the problems of mutual international help on business problems. But a plea can be made for the publication at some future date of economic and statistical case histories of these pioneer firms to enable a clearer judgment to be made of the workings of scientific management and the trends in retail trading in different countries.

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Price Control. Government Intervention or the Free Market? By F. R. J. JERVIS. (London: Hutchinson's Scientific and Technical Publications, 1949. Pp. 224. 12*s.* 6*d.*)

Individual Firm Adjustments Under OPA. By S. S. MCMILLAN. (Bloomington, Indiana: The Principia Press, 1949. Pp. xv + 256.)

DURING the last ten years immense experience has been gained in the administration of price control in many different countries, and a detailed study of the economic effects of the various measures would be of great interest. Although Mr. Jervis and Dr. McMillan are both concerned with aspects of this subject, neither has attempted to grapple closely with the major economic issues raised by the policy. Still, their books are useful, and it would be ungracious to criticise authors who have had certain purposes in mind for not having written with different intentions.

Mr. Jervis covers a very wide field in his little book. After

a brief exposition of the functions of the free market price, he proceeds rather breathlessly to survey the extensive region in which its operation is now subject to some form of control. Government intervention in the price policy of public-utility enterprises, the regulation of commodity prices by associated producers, Government control over retail prices and rents, the substitution of bulk buying by the State for private trading in the commodity markets and Government restrictions upon private profits, all these come under review. The main facts are concisely set down, and the consequences of the departure from the principles of a free pricing system are clearly expounded. The wide range of topics with which Mr. Jervis deals leaves him little opportunity for probing deeply into the operations of these controls; but his book should be useful for the general reader or elementary student who wishes to inform himself of the nature and extent of Government interference with market processes during recent years.

Mr. Jervis writes as one who abhors the controls that he describes, and his book is in the form of a polemic rather than of a survey. This gives forcefulness to his exposition; but he sometimes does less than justice to the practical difficulties which led to the imposition of the controls. For instance, even though one may accept most of his criticisms of retail price control, one is left unconvinced that its effects have been wholly mischievous. In the first place, it is misleading to ignore the part that price control may play in checking the development of the wage–price spiral, and a realistic treatment of the subject requires a direct approach to the question whether the unfortunate effects of price control on the disposition of resources and on production outweigh the probable consequences of uncontrolled inflation. It is easy, but not very helpful, to argue that the reduction of the inflationary pressure is the proper solution. In the context of general economic policy this may be true enough; but what one really wants to find in a book on price control is a discussion of whether price control, *given the inflationary situation*, is on balance beneficial. In the second place, it is impossible to understand the working of price control in this country during and immediately after the war, unless one realises that it was merely one part of a system of controls, each of which reinforced the other. During the last two or three years the price-control machinery has operated with growing difficulty because many other controls, formerly associated with it, have been abandoned, and price control has been left to perform tasks beyond its powers.

Dr. McMillan's book is of a very different type. The author was a prominent member of the Office of Price Administration during the war, and in the light of his experience he has reviewed the administration of what was called in the United States "individual firm price adjustments" as distinct from "general or industry-wide actions." In the United States, as in this country, the general measures included the imposition of "price freezes," the issue of orders which laid down maximum cash prices or margins, and the provision of "formulas" by which sellers could calculate the maximum legal prices of their goods. These general measures, especially those that fell under the first two heads, sometimes led to hardships for individual firms, or seriously interfered with the supply of essential commodities. So, in order to introduce flexibility into the price-control system, it was necessary to set up machinery for dealing with the prices of particular firms in cases where the general "ceilings" were inappropriate. In the United States an elaborate organisation was created and a body of rules worked out for handling these cases, and Dr. McMillan's book is mainly concerned with a detailed examination of this part of the price-control system. In Great Britain this problem was normally dealt with by the issue of directions, under the various Price Control Orders, to individual firms. What surprises the English reader is the vast number of "individual firm adjustments" found necessary in the United States; the author estimates that up to June 1946 there were over 100,000 cases and that 55,000 of these were handled in less than two years. The problem at no time assumed anything like this prominence in Great Britain, and the striking contrast between the experience of the two countries in this respect doubtless depended partly on differences in methods of price control and partly on differences in the economic conditions with which the administrators of the policy were confronted.

Dr. McMillan's account brings home to the English reader, first, that at the centre of government the functions of price control were much more highly concentrated in the United States than in Great Britain, where during the war they were shared among many Government Departments, and second, that greater administrative discretion was given in the United States than here, especially in connection with the delegation of authority to "field offices." The author is satisfied that price control played an important part in checking inflation; but his analysis of economic consequences is not carried very far, and his book throws more light on the administrative problems than on the perplexing

economic issues raised by the policy. Nevertheless, he has made a useful contribution to the economic history of the Second World War.

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Die Selbstregulierung der Zahlungsbilanz. By EMIL KÜNG. (St. Galler Wirtschaftswissenschaftliche Forschungen, Band 5.) (St. Gallen : Verlag der Fehr'schen Buchhandlung, 1948. 9½". Pp. x + 256. S. fr. 25.)

Two thoughts struck the reviewer on laying down this book. The first was that contemporary theory has remarkably little to say on the way in which the level of prices is related to the level of employment. In multiplier-analysis the conventional assumption is that prices are constant, at least until full employment is reached. Until it is, incomes have to bear the whole strain of domestic and international adjustment; thereafter price-movements take over. The formal theory of the way in which the two co-operate is, to say the least, somewhat sketchy.

The second thought (largely prompted by a series of discussions with Dr. J. S. Pesmazoglu) was that imports are too frequently treated as though they were simply " induced " items, depending passively on the level of income in the importing country. This may be a legitimate way of looking at imports of consumers' goods, but imports of investment goods (which comprise quite a large proportion of total imports in the real world) are surely as autonomous as investment itself. Whether they are most conveniently regarded as depending on the level of income, the rate of change of income, the expected rate of profit or something quite different is a question not yet settled. But it is beyond dispute that increased imports, far from being a mere " leakage " from the circular flow, often constitute an essential pre-requisite for increased investment. The history of E.R.P. bears ample witness on this point.

These are criticisms of contemporary theory rather than the book under review. Indeed, Dr. Küng has threaded his way with rare skill through the many difficulties which inevitably beset anyone trying to give a reasonably complete account of the working of the balance-of-payments mechanism in an uncontrolled economy. He expresses few views of great originality; but his touch is uniformly sure, and—whether he is describing the idiosyncracies of the classical gold standard or the complexities of

currently fashionable multiplier-analysis—his exposition is admirably lucid. Among professional economists theoretical virtuosity is all too often coupled with a startling naïveté, but Dr. Küng is refreshingly free from illusions about the remoteness from reality of much of the formal theory he elucidates. His book can be warmly recommended to anyone with a reading knowledge of German.

J. DE V. GRAAFF

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Ricerche sui contributi inglesi alla teoria della moneta. By ERALDO FOSSATI. (Florence : Casa Editrice Del Dott. Carlo Cija. 1940, Pp. 263.)

THIS, the first volume of a study of the development of British monetary theory between 1797 and 1844, covers the years from 1797 to 1811. From the theoretical standpoint this earlier period is in many ways more interesting and important, and has been less closely studied, than the later period which led up to the passing of the Bank Act of 1844.

Professor Fossati attributes the main credit for establishing the theory of money and bank credit on sound lines to Walter Boyd, Henry Thornton, Lord King and John Wheatley, all of whom wrote books or pamphlets of outstanding merit between 1800 and 1803. It was these writings which formed the basis of the important Report of the Parliamentary Committee on monetary conditions in Ireland, which was published in 1804, and which anticipated in matters of fundamental doctrine so much that appeared six years later in the far more widely known Bullion Report of 1810. He says of the Irish Report that—

> " it is of great value for the theory of money as it confirmed principles which had been enunciated in recent writings. The depreciation of money as indicated by the rate of exchange and the high price of gold; the quantity theory established to clarify the relation between money and prices; the mechanism of the exchanges, with the determination of the limits of fluctuation under conditions of convertibility; the balance of payments as one of the elements influencing the exchanges; deflation as a means of raising the value of the currency in circulation—these are henceforward principles which have been acquired by economic science within the brief space of four years."

He also accords high praise to the work of Leslie Foster (1804), William Blake (1810), and, for certain important aspects of the

effect of credit upon prices, to Dugald Stewart (1811). In general, he holds that the originality of Ricardo's contributions to monetary theory has been exaggerated by subsequent writers. As only one example of this, the purchasing power parity theory of the exchanges was formulated for the first time by John Wheatley, several years earlier than Richardo's own contributions on the subject. In certain respects the work of Ricardo was less creative and indeed less far-seeing than that of some of his immediate precedessors and contemporaries.

Professor Fossati has made a very useful addition to the literature of the history of economic doctrine in the special field of monetary theory. His book is well and clearly written, and the extracts from the writings of the period are excellently chosen. His own critical comments add appreciably to the value of the work.

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The United States and the Restoration of World Trade. An Analysis and Appraisal of the ITO Charter and the General Agreement on Tariffs and Trade. By W. A. BROWN. (Washington D.C. : The Brookings Institution, 1950. Pp. xiii + 572.)

THE purpose of this study of the I.T.O. Charter and of the General Agreement on Tariffs and Trade is " to examine these two international instruments, to trace their historical origins, to clarify and explain their provisions, to place them in their contemporary setting, and to evaluate them as instruments of United States foreign economic policy." This last part of the study, in which the author gives reasons for his personal view that the United States should ratify the I.T.O. Charter, comprises only a small part of the total. Some 170 pages (nearly one-third of the book) are devoted to an appendix containing the text of the Charter, with minor omissions and verbal changes, re-arranged in a manner intended to facilitate its detailed study. The text consists mainly of a painstaking, factual analysis of the historical origins (including a long account of the negotiations in London, New York, Geneva and Havana), of the exceedingly complicated provisions of the Charter and of the General Agreement, of their relation to each other and to the United Nations machinery, and of the legislative and administrative action required by the United States if the Charter is ratified.

Since the author does not shirk detail, the book is necessarily

long, somewhat repetitive and at times heavy going. But it undoubtedly helps the reader to a proper understanding of the basic documents. It shows the significance, which might otherwise be misunderstood or overlooked, of particular words and phrases, often adopted only after long debate. The account of the negotiations will be of particular interest. The author was an official of the Department of State when the ideas that led to the negotiation of the Charter were first being developed, and he attended the Geneva and Havana conferences as an observer for the Brookings Institution. He has also worked through the mass of documents available at U.N. Headquarters relating to the negotiations. The summary he gives of the discussions will be of considerable use to the student of the Charter. His sorting out of the main issues raised and his listing of the arguments used by different countries provide raw material which may prove stimulating to the international trade theorist. His account illustrates the difficulty of reconciling divergent philosophies and the interests of some fifty sovereign states without fatally weakening the resulting agreement. He does not fail to emphasise the departures from liberal trading principles contained in the Charter to suit United States requirements, in particular, the " comprehensive provisions for special treatment of trade in agricultural products, which would allow the U.S. as a member of the I.T.O. to continue its agricultural two-price system." A recurring theme in the book is indeed the " basic conflict " between United States foreign and agricultural policy.

There is an interesting account of the experience to date of G.A.T.T. Quite apart from negotiating reductions in trade barriers, the contracting parties have been called upon to deal with a considerable number of special problems, including complaints by Cuba about the reduction of preferences granted by the United States, by Czechoslovakia about United States export restrictions, by France about Brazilian consumption taxes, by Pakistan about discriminatory internal taxation in India, by the United States about import regulations in Cuba, and applications from Brazil for permission to withdraw tariff concessions, from Ceylon and other underdeveloped countries for permission to impose or retain quantitative import restrictions for economic development, from the United States for permission to grant new preferences to the Marianas, Caroline and Marshall Islands (an application criticised by the author). Some of the decisions made may be taken as precedents by the I.T.O. if it comes into being. The author concludes that the experience of G.A.T.T. " proves

the usefulness of an international forum in which countries work out problems relating to commercial policy under agreed rules and procedures."

In a final chapter the author discusses four main courses of action open to the United States if the Charter is rejected. One would be a return to bilateral negotiations under the Trade Agreements Programme, and another the use of G.A.T.T. as the principal instrument of United States commercial policy. A third would be an attempt to re-negotiate the Charter to secure a better document from the United States point of view; the author is rightly sceptical of the possibilities. A fourth would be resumption of full freedom of action; here the author describes a school of thought in the United States that would seem to advocate " an aggressive trade war against all countries that do not accept ' liberal-capitalist ' ideas and methods."

But there is little language of this type in the book. It is almost wholly a sober, factual analysis. The reader must not expect to find in it a full treatment of all the puzzling problems of international trade that have been raised in recent years; certain issues that have aroused considerable controversy are hardly mentioned. The book is of value mainly as " a permanent and definitive record of the most comprehensive series of international economic negotiations ever undertaken."

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Human Behaviour and the Principle of Least Effort. By G. K. Zipf. (Cambridge, Mass.: Addison–Wesley Press, 1949. Pp. x + 573. $6.50.)

Dr. Zipf, in this " Introduction to Human Ecology " maintains that in human organisation and behaviour a distribution of values is frequently found such that the highest to the lowest values follow one another in series according to a particular formula. This formula, which is one of harmonic progression (or rather degression) type, *e.g.*, 100, 50, 33⅓, 25, 20 . . ., holds when items are ranked in order of magnitude. It applies, according to Dr. Zipf, to such diverse phenomena as individual's incomes (where he claims to correct the Pareto formula), the largest cities of a country ranked in the order of their population, industries ranked in order of their number of establishments and words ranked in order of the frequency of their use, even (pp. 25 ff.) by James Joyce.

Up to this point we can follow Dr. Zipf, though verification

would be easier if he gave more names, times, places and figures instead of graphs. Undoubtedly there are certain distribution formulæ followed by human organisation and events; the normal Gaussian distribution is one. But where we cannot follow him is in supposing the harmonic distributions he has disclosed to be in some special sense unique, nay, almost mystic in quality; or always to depend on a principle of least effort.

Dr. Zipf's data are mainly of the type where the frequency distribution is positively skewed, that is to say there are only a few items with large values but many with small. There are, for instance, few very large towns but many small towns and villages; a few industries with very many plants, many with only a few; and, of course, few rich men and many poor.

The double logarithmic charts comparing theory and empirical data look convincing, because points are placed in order of their magnitude, largest first from left to right. The curve is therefore bound to slope downward to the right. And the points farthest to the right, where values are small and items many, will show by this very bunching a strikingly continuous curve.

The particular interest of Dr. Zipf's book to an economist is the extreme " economic man " interpretation he uses to explain his series. His argument summarising the distribution of economic power and social status in terms of income and wealth (on p. 500) is that " a person is always economical, and that it is always economical for a person to procure some one else to do his work for him." It is difficult to pin down Dr. Zipf to a precise application of his theory, but one gathers that a bureaucratic élite gets an inferior class to do its work at a lower income, that class in turn a sub-inferior class, till the process of delegation and exploitation at lower and lower wages reaches the bottom sub-sub-sub pariah class. There is thus a succession of income levels, for some reason harmonic in series. This succession also apparently applies to incomes and the wealth of groups and institutions, *e.g.*, the assets of corporations.

Economic and political status certainly presents the hierarchical principle of the greater the fewer, the humbler the more frequent; but whether the humbler always increase precisely on the Zipfian formula and if so, why, remains still to the reviewer an open, though certainly interesting, question. The answer worked out in this book is perhaps something more than just a *mystique* or a King Charles' head and may incidentally prove useful. The non-Gaussian, highly skewed distribution is fairly frequent in economic behaviour. Besides Zipf's instances there are the

shareholdings in Joint Stock Companies; the sizes of factories in any one industry or manufacturing generally; the sizes of localised production centres in any industry. Here averages and deviations from average are of little significance, if not positively misleading, and other methods must be found of summing up the general level, the degree of variability and the shape of distributions. The harmonic series, with its relatively thick long tail, certainly resembles the shape of much human behaviour and organisation. Comparison of observed facts with some theoretic series of this type used as a standard may well bring order, perspective and analysis into what are now mere detailed descriptions.

P. SARGANT FLORENCE.

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Teoria de la Politica Social. By MANUEL DE TORRES. (Madrid: Aguilar, S.A. de Ediciones, 1949. Pp. xxiv, 314. 80 pesetas.)

IN his prologue Professor Torres tells us that he has sought in the *Theory of Social Policy* to discuss the economist's contribution to formulating the ends of social policy and to analysing the means whereby they may be attained. As regards the goals of policy, he considers that decisions here should be left to the political authority guided by current sentiments and opinions. For all that, Professor Torres does have in mind a very definite aim for social policy: the redistribution of income. Indeed, policy is "social" for the most part where it involves some redistribution of income. Nonetheless, while the book centres on this problem, we are not told how great a redistribution is envisaged. A movement of income towards entrepreneurs is considered to be bad, and one towards wage-earners good.

The yardstick whereby Professor Torres measures the redistribution effect of a policy is its impact on profits. In consequence, his macro-economic theory of profits has a crucial rôle to play. Profits are held to be equal to investment minus savings. The basic assumption underlying this conclusion is the rather odd one that the outlay of entrepreneurs as a whole consists of payments for capital and labour used in the consumption-goods industries only. Unfortunately this assumption is not discussed; and, indeed, it appears to be at variance with Professor Torres' useful exposition of the real and monetary flows in the economy.

The subsequent chapters contain, for the most part, discus-

sions of different policies in the light of their effects on distribution. Thus in the chapter on full employment, Professor Torres briefly outlines the difficulties of defining full employment and then proceeds to discuss full-employment policies and redistribution. Policies stimulating investment raise employment, but they also raise profits—savings being assumed to remain constant or to rise less than investment. This increase in profits is interpreted as indicating a shift of income towards entrepreneurs. Thus efforts to raise employment through stimulating consumption are considered to be best, although much will depend on current circumstances.

This conclusion as to the compatibility of redistribution and full-employment policies is used to support the advisability of the former. The argument is that measures for redistribution can be used to stimulate employment, and that full employment ensures maximum production. There is, however, no discussion of incentives and productivity.

Professor Torres sets out carefully the various forms of redistribution and discusses the means for achieving them. There is, first, qualitative redistribution which involves direct control of consumption. This raises the great issue of how far the State should go in curbing the individual's freedom, but unfortunately he considers this to be beyond his terms of reference. Functional redistribution is carefully examined, but is not favoured, as it shifts income from class to class and not necessarily from rich to poor. Lastly, there is quantitative or personal redistribution. Professor Torres probes carefully into the causes of personal inequality of incomes, but he does not examine so thoroughly the ways of changing this inequality.

This concludes the general section of the book. In the second part, there are a number of chapters on various aspects of social policy: wages policy, the financing of social security, profit-sharing schemes and agricultural policy. These chapters contain much that is of great interest, but one may perhaps be justified in being hesitant about some of the author's more precise conclusions on such complex problems. Thus there is much truth in the assertion that a general rise in wages benefits entrepreneurs only; but assumptions should be made more clear. The examination of the various means of financing social-security measures is a careful essay on a difficult subject; but can we really be as certain as is Professor Torres on the difficult problem of the incidence of taxation and of other special levies? On the other hand, there is a most interesting chapter on the vicissitudes of the profit-

sharing movement on the Continent; and a brief but informative sketch of the structure of Spanish agriculture.

A. D. KNOX

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New Worlds Emerging. By EARL PARKER HANSON. (London: Gollancz, 1950. Pp. xx + 385. 16*s*.)

MR. HANSON is by training an engineer, but by experience and inclination he is a geographer who has acted as expert consultant and explorer in several tropical and arctic regions. On the basis of these experiences, he sets out enthusiastically to refute the assertions of "academicians"—soil scientists, geographers, meteorologists and agronomists—that these frontier zones are unfit for white settlement. With a wealth of illustration, he points out repeatedly that shortages of labour (white or coloured) and capital, not climatic factors, have inhibited development in the past; wherever these shortages are remedied, there are "new worlds emerging."

This early part of the book, which sweeps from continent to continent surveying agriculture in the Arctic, settlement in the rain-forest and industrialisation in the Caribbean, makes fascinating reading. But Mr. Hanson believes other experts to be in error, and he undertakes to answer the prophets of secular stagnation as well as those "Neo-Malthusian Jeremiahs" who foresee a future ruined by an exhausted and over-populated land. The new worlds emerging, he believes, provide both outlets for the savings of mature economies and overflow areas for the excess workers of densely populated countries.

Against secular stagnation he presents a convincing case. In all areas he distinguishes three historical periods: first, primitive agricultural quiescence; then colonial-imperial growth (during which foreign investment is applied extensively in the hope of high remitted profits); and finally advanced industrialisation (financed by intensive foreign and home investment, protected by tariffs and nationalistic controls and accompanied by secondary and tertiary enterprises). In this third period it is necessary to educate both native labour and foreign investor, the former in techniques and government, the latter in concepts of decent treatment of coloured labourers and respect for their institutions. Although Mr. Hanson shows an unfortunate inconsistency in his attitude to exploitation, blessing it in Siberia and Liberia, and cursing it in Puerto Rico and the Amazon, it is not difficult to

share his faith that there need be no secular stagnation for the lack of new frontiers.

His direct replies to the Malthusian hypotheses of Vogt and Osborne are not so convincing. These writers have earnestly advocated widespread birth control and wholesale soil-conservation measures to prevent an otherwise inevitable future coincidence of swollen populations and land exhaustion. While each of the areas discussed by Hanson has interesting possibilities for expansion, he has not shown that taken together they can produce enough food or support enough immigrants to prevent the disaster. For example, his enthusiastic description of the Amazon basin is punctuated with damaging admissions of its limitation to cattle and forest cultures—hardly scope for the support of large populations; while his chapter on Alaska certainly fails to carry conviction that this territory can support the ten million persons one of his sources claims. Northern Canada is not discussed, and the economic arguments about Africa hang by analogy with his Liberian experiences, and seem to depend on his peculiar conviction that alternative sources must be found for the raw materials produced in the British Empire. The optimistic suggestion that our century parallels the age of exploration of the fifteenth and sixteenth centuries violates the caution and consideration he recommends to other specialists.

Mr. Hanson's book is an enjoyable onslaught on long-cherished myths about the rigours and impossibilities of settlement in the non-temperate zones, and a stimulating sketch of the maturing industries of the tropical states. While his counterblast to the Malthusian prophets does destroy part of their flimsy argumentative structure, it does not provide the needed point-by-point evaluation of the confused pictures of uncurbed population growth and resource exhaustion.

A. D. SCOTT

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Negroes in American Society. MAURICE R. DAVIE. (New York and London: McGraw-Hill, 1949. Pp. ix + 542. 38*s.* 6*d.*)

THIS is an excellent survey by a leading American sociologist of what may be termed the "Condition of the American Negro Question" in all its ramifications. The American Sociologist, social worker and administrator—as well as the American statesman—can take great credit for the thought and the care he has lavished on this problem during the past generation, and for the

results in terms of better standards of living and of behaviour which are now beginning to emerge. These facts are not as well known as they should be in this country, and a work of reference in which they are contained in a small compass has a special value to the British reader.

The bulk of Professor Davie's work is devoted to historical and sociological analysis of the position of the Negro in American Society. On such subjects as the Family, Education and Housing it provides an excellent summary of the available information and of the conclusions of contemporary authors. The book also contains a temperate but unflinching account of much more explosive topics, such as lynching and Jim Crow Legislation. It is well informed (save in a brief passage relating to the West Indies) and accurate. Moreover, the author has obviously identified himself with the Negroes in his own community and seeks at every turn to point out the most suitable paths towards further progress.

It is, therefore, very reassuring that Professor Davie's conclusions as to future probabilities are, on the whole, optimistic. The Negro has been steadily gaining in political power during the present century, and the Supreme Court has given more and more attention to redressing his grievances. Improvements in social attitudes are evidenced by gains which have been made in education and in employment and by the social recognition which leading Negroes are steadily acquiring for themselves. The policies of the enlightened Trade Unions and of the C.I.O. are, indeed, in the direction of the complete elimination of the "Negro Problem" in the industrial field. Even in the South, Professor Davie concludes that the trend in race relations is "towards equalisation within the framework of segregation." So far as his standard of living is concerned, the Negro has benefited by the general improvement which has taken place in recent years from South to North, from agricultural to industrial employment and from countryside to town.

The keynote of Professor Davie's treatment of the whole subject is, indeed, that the future may be faced with confidence if attention is concentrated on the improvement of the social framework rather than on moral exhortation to humanity and over-emphasis on guilt, particularly of the Southern variety. The diminution of the Negro's poverty gives him an excellent illustration of this theme because the "significant trend in Southern regional planning is that of improving the conditions of all the people together. . . . A long-term programme of industrialization

and improvement of facilities for communication and mobility might well do more to reduce hostility between Negros and whites in the South than the most elaborate attempts at education and propaganda."

Professor Davie, therefore, criticises the appeal which Dr. Myrdal made in *An American Dilemma* to individuals to amend their values and attitudes. This, he argues, involves the fallacy that the Negro problem is primarily a moral rather than a social issue and underestimates the importance of the irrational in human behaviour. The problem is, in his analysis, rather to readjust the institutional structure of society so as to make it more difficult for the ordinary man to adopt two conflicting codes of behaviour in relation to his White and Negro fellow citizens, as the Southern visitor to the North finds it possible to do only too easily. The "direct" approach is attractive because it seems to make it possible to "get something done now"—the "indirect," operating through such expedients as Fair Employment Practices legislation, takes longer to produce an obvious result, but it is the method which "sticks." We have much to learn from analysis of this kind in the British Empire.

T. S. SIMEY

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Backwood's Utopias: The Sectarian and Owenite Phases of Communitarian Socialism in America: 1663–1829. By A. E. BESTOR. (Philadelphia: University of Pennyslvania Press (London: Geoffrey Cumberlege), 1950. Pp. 288. 28*s*.)

FRANCES TROLLOPE in her *Domestic Manners of the Americans* (1832)—she had gone out as the advance guard of her husband's Bazaar, "Trollope's Folly," as it came to be known in its Eden of Cincinnati—draws three unforgettable pictures: the lecture of her feminist friend, Miss Wright of Nashoba, a revivalist camp meeting in the forest by moonlight, and the debate at Cincinatti in the early summer of 1829 between "Mr. Owen of Lanark New Harmony and Texas" and the Rev. Mr. Campbell—

> "Never did any one practise the *suaviter in modo* with more powerful effect than Mr. Owen. The gentle tone of his voice; his mild, sometimes playful, but never ironical manner; the absence of every vehement or harsh expression; the affectionate interest expressed for "the whole human family"; the air of candour with which he expressed his wish to be convinced if he was wrong, if he indeed were so—his kind smile—the mild expression of his eyes—in

> short, his whole manner, disarmed zeal, and produced a degree of tolerance that those who did not hear him would hardly believe possible."

It is with this Owen that Professor Bestor is concerned and in particular with the five years which he spent in America from November 1824 to the summer of 1829, advocating "Communitarian socialism" and establishing the Community of New Harmony in Indiana on land which after a whirlwind tour of applauded lectures in the East he purchased from Father Rapp on January 3, 1825. Thus Harmonie of the Rappite became New Harmony of the Owenites—or Disharmony as it was jeeringly called ere long.

We on this side of the Atlantic find the Owenite literature sufficiently heavy, whether we are of the old school nurtured on the Foxwell Collection or the new generation that can consult the private papers in Holyoake House, Manchester. But when Owen is related to community history, the birth of the idea, the pre-Owenite and the rival communities in America and the five years of New Harmony itself, the literature on the American side alone is enormous; and that one scholar could master both fields, as our author with his elaborate documentation clearly has done, is a testimony to high scholarship.

There is, I fancy, no man about whom more biographies, or central chapters, have been or will be written: no man who is so woven into the fabric of social history as this leader and lawgiver of the New Industrialism; and it is because he was both that he is of more enduring importance than Fourier. Industrial Management, factory laws, consumer's co-operation, labour exchanges, mutuality, trade unionism, juvenile and adult education, religious toleration, the sociology of environment, the economics of town and country life: each of these great topics of world-wide interest draws on the Owenite fountain. What the American experience proves is that a great idea can survive defeat. He returned to England, his fortune mostly gone, only to be more powerful than ever—not that he kept his failure quiet, he went on to repeat it in England—to be in fact the spiritual core of the urge to voluntary economic association in a world tyrannised by individualist excess. For he preached at bottom neither revolution nor gradualism, neither Marx nor Fabian Society, but the peaceful timeless joys of brotherly love.

Professor Bestor throws the limelight on more figures than Owen himself—on William Maclure, his partner and critic, on his sons William and Robert Dale, on Frances Wright, an evangelist, also from the Old World. He has given us much, but one

could wish from him this much more—a bold projection of the Owen of 1829 into the remaining years of an astonishing life. "The Fulfilment of Robert Owen."

C. R. FAY

Cambridge.

Quaker Social History : 1669–1738. By ARNOLD LLOYD. (London : Longmans, Green, 1950. Pp. xv. + 207. 21*s.*)

THE "people of God in scorn called Quakers" provide an excellent excuse for following the present fashion of writing history and calling it social history. One of the most considerable and vigorous of the sects of the seventeenth century, the Quakers declined in numbers, relative to the total population, until to-day the Society of Friends counts only one member in each 2,500 of the inhabitants of Great Britain. But in generation after generation this small body has produced men and ideas of importance in our national life; and on the whole these men and these ideas cannot rightly be interpreted without knowing something of the religious background from which they came.

The economic historian, in particular, cannot go far in the last three hundred years without coming across evidence of the Quaker influence. From the time of John Bellers, whose *Proposals for Raising a College of Industry* (1695) earned a well-deserved nod of approval from Karl Marx, the names of Quaker families crop up continually : Darby and Huntsman in iron and steel, Pease and Bradshaw in railways, John Bright and Joseph Sturge, Barclay, Lloyd, Gurney, Backhouse, Seebohm, Braithwaite, Bryant and May, Allen and Hanbury, Huntley and Palmer, Clark, Reckitt, Horniman, Christy, Fry, Tuke, Cadbury, Rowntree, Alexander, Gillett, Bevan and many more. But not very much is known about the social structure of Quakerism, especially in its early days.[1] Present-day Friends tend to believe, without much evidence, that their forefathers were rude and lived in hamlets—it is, indeed, a matter of faith that religious movements begin with the Common People. It is further believed that, by telling the truth and diligently refraining from putting sand in their sugar, Quaker tradesmen rose to positions of wealth and importance; and, becoming in a generation or two tired of trying to force their substantial camels through a needle's eye, they then left the Society of Friends and became pillars of the Church.

[1] Some facts have since been presented in *Quakers in Science and Industry*, by Arthur Raistrick (Bannisdale Press, 1950), pp. 28–32, 40–1.

The latter sad declension is summed up in the saying: "A Carriage and Pair drives not long to a Meeting-House."

It is time that this mythology was put to the test of facts. Is it true that a high standard of rectitude leads to success in business? The charm does not seem to work so well in the twentieth century—the typical Friend of 1950 is a schoolteacher or a Civil Servant, somewhere in the middle reaches of salaried respectability, rather than a Marshallian entrepreneur. But the social position of his seventeenth-century forebears remains distinctly hazy. Part of the trouble (and this is what makes the subject so fascinating to the historian of local or national affairs) is the immense volume of original source material. The minutes of numerous business meetings, the registers of births, marriages and deaths, books of account, journals and biographies exist from the seventeenth century to the present day in remarkable variety and completeness. The great volumes of recorded Sufferings, noting for year after year in meticulous detail the distraints for tithes, would provide material for several theses.

It is therefore with some disappointment that we discover that Dr. Lloyd has not written a social history of early Quakerism at all. He was apparently inspired by the discovery of a late copy of a paper of advices by George Fox, dating from 1669, called "Friends' fellowship must be in the Spirit." The discovery was not in itself of importance, since numerous earlier copies are known, but Dr. Lloyd compared his document with a later volume of advice, the *Christian and Brotherly Advices* of 1738. (Hence the dates 1669–1738 in the title, though the book in fact ranges back to about 1650.) The contrast, like other contrasts between the seventeenth and eighteenth centuries, is considerable; by 1738 it was probably becoming unusual to refer to reverend gentlemen as "the priests of Baal, who are the rough hands of Esau and fists of wickedness, and bloody hands." But was Quakerism undergoing a social change, becoming middle-class and throwing off the roughness of its plebeian origin? Or did substantial shopkeepers and farmers of 1670 enjoy damning their opponents with unbridled language? Did the poor and the outcast flock to George Fox's sermons for entertainment (the Cup Final being then unknown), or as hangers-on of their richer neighbours—or were they really the main substance of early Quakerism? I do not know; and I doubt if Dr. Lloyd knows either.

In fact, Dr. Lloyd's book consists of a series of essays on matters such as the evolution of Church government, poor relief, Quaker marriage, the attitude to women, the printing of books and the

keeping of accounts. Each by itself is of some interest, but the connection between them is less than can be justified even by compression within the unpromising framework of a thesis. The book reads as though one is starting it in the middle; and all the art of the publisher, expressed in pleasant type and good illustrations, fails to make it easy going. One has the impression, in fact, that the author never managed to digest the material he was using. At the few points where a general reader can check his statements, he tends to show those slight inaccuracies which, though individually unimportant, destroy one's faith in the veracity of the statements that one cannot easily check.

The standard histories of Quakerism, by William Charles Braithwaite and Rufus M. Jones, were written to convince as well as to describe. Both the economic and the general historian would be helped by a re-assessment of the formative years of the Quaker community. Dr. Lloyd has not yet succeeded in this task; but it is to be hoped that he, or another, will try again.

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Economics and the Public Welfare. Financial and Economic History of the United States, 1914–1946. By BENJAMIN M. ANDERSON. (London: Macmillan, 1949. Pp. 602 +xiv. 42*s*.)

THE late Professor Benjamin Anderson was the economist of the Chase National Bank throughout the inter-war years, a position which put him in close touch with bankers and banking opinion and permitted him to observe monetary developments at close range. This book is his account and interpretation of the financial and economic history of the United States in the years 1914–46. Compiled largely from his own contemporary reports on financial affairs in the *Chase Economic Bulletin*, its text and footnotes liberally studded with "I-told-you-so"s, it is a highly personal book. Professor Anderson was an uncompromising economic liberal of the old school, thoroughly imbued with the principles of conservative banking, and he found much to disapprove of in the financial and economic events of which he wrote. It apparently never occurred to him that history is more than an opportunity for expressing approval or disapproval.

Many of his judgments on monetary events were shrewdly taken. He saw, for example, more clearly than many American economists of less sternly liberal persuasion the contribution to

international difficulties made by the failure to reduce American tariffs after the First World War in line with the new creditor position of the United States; on the other hand, it is difficult to accept his statement that the Republican National Convention of 1920 realised the necessity for reducing tariffs and decided to reverse its tariff policy, but was frustrated by the stupidity of President Harding. He was not carried away in the latter twenties by the naïve faith of the Federal Reserve Board that it had found the way to control the American economy, though one cannot share his belief (p. 136) that :

> The Federal Reserve Act would have worked well had traditional central bank policies been followed, namely : the holding of the rediscount rates above the market rates, and the use of open market operations primarily as an instrumentality for tightening the money market, not for relaxing it."

He appreciated the obstructions to national and international recovery created by many of the New Deal measures in the thirties, obstructions which it has since become fashionable to understate. But again, his contention that the New Deal was responsible for the continuance of depression through the latter thirties is unconvincing. Finally, in 1945 he favoured a large outright gift to Britain in place of the American loan.

Others of his judgments, some of which have already been mentioned, can hardly be described as acute. Were British difficulties in the nineteen-twenties chiefly caused by adherence to a cheap-money policy? Is it true that England " made no fight at all " to stay on the gold standard in 1931? Did Federal Reserve policy, contrary to the findings of recent research, have nothing to do with the crisis of 1937, the blame falling almost exclusively on the trade unions? Finally, can the world depression of 1930–39 be completely attributed to " the efforts of the governments, and very especially of the Government of the United States, to play God " (p. 495)?

Whatever one thinks of Professor Anderson's judgment in particular cases, one cannot fail to be impressed by his grasp of the principles and practice of banking. One cannot say the same for his understanding of monetary theory. The " equilibrium theory," which derives from J. B. Clark and which forms the basis of his interpretations of monetary events, assumes a greater degree of economic flexibility and mobility than most economists would now consider realistic. The " Digression on Keynes," in which he attempts to refute that " dangerously unsound thinker,"

shows a good understanding of the meaning of Say's Law and a keen eye for inconsistencies in the exposition of the *General Theory*, but little conception of the construction and criticism of theoretical models. Wider reading of the post-Keynesian literature, with which the author professes himself unfamiliar, might have made this critique of the *General Theory* more effective.

In summary, this is a book by an orthodox banker, addressed chiefly to other bankers. The style itself is a banker's style, quoting excessively from the opinions and experiences of leading bankers, often unnamed. ("One fine veteran, a very upright man, faced this problem [the questionnaires required under the Banking Act of 1933], labored with it for several days and finally threw up his hands in despair. He died that night." (P. 337.)) It is interesting to have a record of New York banking opinion on the events of these important years, but need it have been embellished with this misleading title or the extravagant foreword by Mr. Henry Hazlitt?

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The King's Highway. By REES JEFFREYS. (London: The Batchworth Press, 1949. Pp. xix + 292. 18*s*.)

MR. REES JEFFREYS describes his contribution on the title page as "an historical and autobiographical record of the developments of the past sixty years." Like many another autobiography, *The King's Highway* will interest first of all those who know the author and the many people mentioned in his pages. The road-user, interested in the provenance of the motorway and in the manner in which it has been created out of the country byways of the nineteenth century, will be rewarded by a wealth of detail and anecdote—and he may share the author's animosity against those who diverted the proceeds of motor taxation into the Exchequer! The railway fancier, on the other hand, will find nothing here. The railways are joined with a parsimonious Treasury and the first chairman of the Road Board as agents of obstruction.

The principal economic and political argument is directed against the Treasury and against the system of central finance which concentrates all public revenues on the Exchequer and causes funds for public expenditure to issue from the Exchequer. Mr. Rees Jeffreys would like to see highway authorities assured of an adequate income and with the right to spend on highway

projects up to the limit of that income. He makes the point that no major roads were built from the time of Telford till the outbreak of the First World War; and that construction between the wars was undertaken in relief of unemployment and not primarily to satisfy the needs of traffic nor the demands of a coherent transport policy. The student of government will remark (possibly without regret) upon the inability and unwillingness of the Road Board to use its ear-marked revenues, the proceeds of motor taxation, as a means of establishing its independence. The economist will note one unfortunate consequence of the subordination of road construction to unemployment relief—the primitive methods of construction usual in this country, undertaken without any of the earth-moving equipment in common use across the Atlantic, and deliberately wasteful of labour. But few economists to-day would agree even with the principle of an authority or authorities competent to construct highways and financially independent of the Treasury. The value of the investment controlled by such an authority puts it among the first of the instruments recommended to any government determined to plan for stability of income and employment. Mr. Rees Jeffreys makes much of the failure of the Road Board (of 1910) to embark on any worthwhile projects of new construction or to incur any heavy expenditure on the security of its revenues, the yield of motor taxation. To this criticism he returns again and again. But only once does he mention, and then almost by the way, that for the last half of the Board's existence, from 1914 to 1918, the country was heavily engaged in the First World War! To those of us who have so recently lived through the Second World War, it would have been surprising, and evidence of a wholly unjustifiable waste of national resources, if the Road Board had indeed been permitted to spend its funds on the purposes for which they had been ear-marked in 1910.

Mr. Jeffreys contributes a most useful chapter on the origins, history and work of the Road Board set up in 1910. But he has disappointingly little to say on the question of road finance, and what he does say is hardly new at this late date. The costs of highways, he declares, should be shared between landowners and motor users and between different classes of each, and the shares should be not only definite but also just and equitable. Possibly—but nothing is said to clear up the many confused and contradictory ideas entertained by the several classes about the size and equity of the share which each should contribute. Mr. Jeffreys finally takes comfort in the fact that, with transport national-

ised, road interests, through the Road Executives of the British Transport Commission, will have "an effective voice inside the counsels of government in favour of a fair outlay upon the King's Highway." He has surely allowed his enthusiasms to run away with his political sagacity, his understanding of the organisation of the British Government and the teachings of his own official experience of thirty-five years ago!

The impression left upon the reviewer by this extremely detailed and often dogmatic record is that of a single-minded and dedicated man. The chronicle (it can hardly be described as a book, if anything more is meant by that term than a collection of chapters upon the same wide subject) picks out first one and then another of a host of topics all in some way connected with the policy (or lack of policy as the author would have it) manifest in the development of the British road system from the earliest days of motoring down to the present. Narrative and argument jump from one subject to another without much obvious continuity, and the style is not improved, nor assimilation assisted, by the author's habit of numbering his points and changing the type face. The volume is well got out, lavishly illustrated and provided with a comprehensive index. But the reviewer notes with regret a certain carelessness once the author strays from his chosen subject. Government could no doubt (p. 194) take steps to encourage the training of highway engineers; but which British University would consent to Government *prescribing* a curriculum for the training of these young men?

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British Broadcasting: A Study in Monopoly. By R. H. COASE. (London: Longmans, Green and the London School of Economics, 1950. Pp. viii + 206. 12*s.* 6*d.*)

How came British broadcasting to be a State monopoly? Having become one, what effects on other broadcasting—*e.g.*, by wire, or by sponsored advertising—followed? What is the public, private and corporate opinion on British monopoly broadcasting? These questions, not really tackled by any book since the beginning of British broadcasting, have been objectively examined and comprehensively answered by Mr. R. H. Coase in a monograph which, well in advance of the Beveridge Committee's report on the renewal of the B.B.C.'s Charter after December 31, 1951, promises to become the *locus classicus* on the matter for some time.

The author disclaims any desire to judge the desirability of monopolistic broadcasting in Britain. But like Adam Smith's entrepreneur he achieves "an end which was not part of his intention"; for his careful accumulation of all public and private evidence, and his strict analyses of charters, blue books and white papers, lead him to a final "commentary" which reads much like a judicial summing-up; and it is not one calculated to let monopoly go scot-free at the hands of the juryman-reader. His last words are:

> ". . . this support for the monopoly also reflects the spirit of the age. According to our temperament, we welcome or acquiesce in the extension of central planning, even, it would appear, when it relates to a source of news and opinion. A monopoly is still regarded with disquiet; but only if it is a private monopoly. A monopoly held by a public authority, as in the case of British broadcasting, is considered to be free from the vices of private monopolies and to possess virtues of its own."

There will be a wide divergence of opinions whether this view of public monopolies, widely held a few years ago, is now valid, in the light of our recent and fuller experiences of other State monopoly-services, from the Coal Board to aviation corporations and from groundnuts to gasworks. The trade-union movement, Fabian Society and political Labour Party are undergoing severe soul-searching on this point. Even if they all keep it secret and nothing results from it, the climate of opinion is changing.

It seems a pity, therefore, that the author confined his timely, valuable and exhaustive study to the external aspects of our broadcasting monopoly—to its development and its "public relations" in the best and widest sense of that term—and did not look at its ecology, methodology and manner of operation as an organism. To take one example: Mr. Coase eschews television; yet in the B.B.C.'s current attitudes to television (especially to its natural claim for separate and singular treatment as a service) are being repeated almost every fallacy which Mr. Coase traces in the development of aural radio. To take another instance: nowhere does the author broach one of the gravest problems both of the B.B.C. and of all other monolithic, overcentralised monopolies, private or public: namely, the rapid and inordinate growth of the incubus known as "staff overhead." The incidence of this "overhead" of administrative personnel and bureaucratic hierarchy, known to the *cognoscenti* of monopolies from Moscow to Michigan as "admin. apoplexy," has become perhaps the B.B.C.'s biggest

and most intractable problem. The Corporation's non-engineering personnel engaged on our domestic service alone has been virtually doubled in fifteen years, but the services to listeners-and lookers-in have not. At the outset or in mid-career, Mr., or Sir John, Reith, the only consistent, individual proponent of monopoly broadcasting, could run "his" monopoly (with its 2,500 employees all told) as Calvin ran Geneva, for the citizens' good as he saw it. It is gravely to be doubted if Sir William Haley or anyone else, inheriting a monopoly composed of world-wide and home services and employing 12,000 persons, could ever compass the altered task on the same Reithian lines. Yet the postponing or procrastinating extensions of the Charter have condemned the "admin." of the Corporation to swell, out of all proportion to its services, while old aims and methods of "admin." were sedulously followed, devolution was frowned on, and the monolith preserved. Upon all this, now the central problem of British broadcasting and all other British monopoly services alike, we must await the Beveridge and other reports. Yet it would have rendered Mr. Coase's study invaluable if he had included the inordinate development of this administrative problem in his analysis; for it is the Old Man of the Sea upon the B.B.C.'s shoulders and much of the travail of the monopoly is due to it.

Valuable, however, his book assuredly is. In this most influential, forward-looking and still largely unpredictable sector of our public life, there have not been more than half a dozen books in England in thirty years to which the serious student of broadcasting could go for enlightenment. Now he will get as much as can be known of the ways in which the listening-set makers, the Press (shortsightedly !), the P.M.G.s of successive governments—by accident of an old statute—and the (then) Mr. Reith all lined up to "lobby" for a State monopoly. He will learn of the fears of the organised Press that it would lose advertising if sponsored advertising were allowed over the air. He will see why innovation, new processes and new ideas of servants of the monopoly are so hard to try out; and why fear and timidity and "playing safe" are the orders of the day. He will enjoy Mr. Coase's own analytical enjoyment as the latter coolly demonstrates that a "good" monopoly, or "the best in the world," can still be made better; that the worst of American methods is not the alternative; that competitive broadcasting *can* be technically arranged; and that—as economists (but few others seem to) know from both Russian and American precedents in "big business"—monopoly needs an efficiency-audit, of which competition between

independent and devolved units is probably the best, and certainly the fairest and least arbitrary. He will also get a penetrating analysis of the politico–ethico–cultural dilemma into which successive governments have pushed the government of the day: in which a Party Cabinet has to preserve the semblance of impartiality on all broadcasting of talks and features, yet cannot give the B.B.C. a really free rein.

The student and the informed layman should be grateful to the author (and the School of Economics) for providing, in time for a critical public decision about British broadcasting, so informative and impartial yet so interestingly written an analysis of a familiar but secretive and strangely unknown British institution; one which has "just growed"; but one which, by common consent, cannot go on as it has gone on for its first generation of life.

GRAHAM HUTTON

London.

NOTES AND MEMORANDA

Measurement of Industrial Efficiency

The question is often asked whether efficiency of an industrial unit can be quantitatively measured, and if so, what should be the standard of measurement which can be applied with reasonable accuracy? While it may be generally agreed that the absolute measurement of efficiency is neither feasible nor practicable, the relative efficiency of different units can be measured with reasonable accuracy. The word "efficiency," as it is commonly understood, is a relative term, and we characterise a particular unit "efficient" or "inefficient" not absolutely but in relation to some other units. It, therefore, pre-supposes some existing standards of valuation. Viewed in that perspective, we believe such efficiency can be quantitatively measured, if not with scientific exactitude, at least with reasonable accuracy.

Standard of Measurement

The serious difficulty, therefore, arises mainly in the choice of selecting some suitable standards. The suitability of any unit of measurement will depend much upon the significance we attach to the word "efficiency." If industrial efficiency consists, as Mr. E. A. G. Robinson has viewed it, "in trying to do with eight men what we have hitherto been doing with ten men," labour productivity per worker, or to put in a more scientific term "labour productivity per man hour (P.M.H.)," may be regarded as a satisfactory criterion for measuring industrial efficiency. If, however, the term "efficiency" is used in a more comprehensive sense, meaning a "measure of securing the greatest results at least cost," "Cost of Production per Unit of Output" can be regarded as a most satisfactory and reliable standard of efficiency. An industrialist will, however, view "efficiency" from some different perspective. His aim is to produce goods with as much profit as can be obtained in the prevalent circumstances, and from that standpoint his success will be judged by his "earning capacity." Rate of profit can, therefore, also be one of the standards of measuring "efficiency." If, however, the word "efficiency" is to be used in its widest sense, it will connote a higher standard of living for the worker, lower prices for the consumers and greater returns to investors. But since in practice these objects are

often in conflict with each other, we cannot think of one common standard of efficiency which can be applicable to all. This limitation prevents the use of " efficiency " in its widest sense.

Thus we see that the standards of measuring efficiency will vary according to the purpose in view. It is also significant to observe that none of the several methods by which " efficiency " can be measured is in itself entirely adequate. If all these criteria are used there is every possibility that the distortions, attributable to any one criterion taken singly, can be easily off-set. Moreover, if the application of all of these standards reveals the dominance of the same tendencies, the general conclusions can be further verified and confirmed.

We can, therefore, use the following standards of measurement for comparing the industrial efficiency of different units :

(i) " Earning " or " Profit-making " capacity of different units;

(ii) Labour Productivity Per-Man-Hour (P.M.H.), and

(iii) Cost of Production per Unit of Output. The lower the cost, the greater is the industrial efficiency.

Rate of Profit as an Index of Efficiency

It is significant to inquire how far the rate of profit is truly indicative of the efficiency of the industry. While, no doubt, gains or losses are the chief criteria by which we judge the success or failure of an enterprise they can by no means be regarded as the sole or even the most important determinant of the efficiency of the industry. Profits are the results of a variety of factors, and since efficiency is only one of them, it will not be wholly correct to establish any correlation between rate of profits earned and the standards of efficiency attained by different units. The rate of profit as an index of the efficiency will, therefore, have to be judged in the light of several qualifications and reservations. First, the rate of profit may vary, even in the same centre, from unit to unit according to the differences in their capital-structure, particularly the relationship between the " owned " and " borrowed " capital; secondly, the rate of profit may vary as a result of the variations in the amount of capital invested; and thirdly, the variations in the rate of profit may be caused by the operation of cyclical influences. All these factors tend to show that the causes, other than efficiency, may also explain and account for the variations of profit-rates. Hence the rate of profit, as an index of efficiency, has its own limitations.

Labour Productivity as an Index of Efficiency

While no doubt, theoretically, " labour productivity per-man-hour (P.M.H.) " is a fairly satisfactory method for measuring the relative efficiency of different units, in practice a number of important limitations render its general application exceedingly difficult. For certain obvious reasons, it is difficult to measure, with mathematical exactitude or scientific accuracy, the labour productivity per man-hour. Even if such computations were possible, it may still be questioned whether the statistical data of different units are truly homogeneous for inter-comparison. The type of goods produced by different units shows wide variations in respect of dimensions, texture, design, finish and quality. The result is that the differences in " productivity " as measured by physical volume of output may only reflect differences in the character of goods produced by different units. Again, the equipment of mills shows such a vast range of variations both in the character of the machinery employed and in capacity and actual output that it is difficult to find any satisfactory basis for evaluating the relative efficiency of different units. Moreover, for any comparison, we shall have to start on the postulation that the conditions of work in different units do not show significant variations, that the units under comparison derive the same benefit in respect of location and that the hours of work and the composition of labour force are the same in all the units. All these assumptions are, of course, too far-reaching in character, and the generalisations based on them may even be regarded as untenable.

Cost of Production

The most reliable and dependable measure for comparing the efficiency of different units is the cost of production per unit of output. The lower the cost per unit of output, the greater is the efficiency attained by the industrial unit. Costs in a competitive economy can therefore be characterised as a " barometer " by which we can measure and compare the relative efficiency of different units.

It need hardly be emphasised that the difficulties of obtaining and verifying costs of different units are infinitely great. Costs are always regarded as a " trade secret " to which an outsider can hardly have any access. Even the Tariff Boards, in spite of their written undertakings that neither the identity of the mills nor the cost statements supplied by them would be disclosed in their published reports, were unable to obtain all the information

they needed. Not only are mill-owners extremely reluctant to disclose any information, they have also, in many instances, ingeniously concealed or manipulated the available information in their published Balance Sheets and Annual Statements. It must, therefore, be admitted that the paucity of statistical information and the extreme variability and complexity of statistical data may prevent a very thorough and searching analysis of the relative efficiency of different units.

Another difficulty arises with regard to the inter-comparison of the costing data. The units are situated in different industrial centres and derive differential advantages in respect of locational economies. The distance of mills from the centres of raw materials and from the sources of power, the varying rates of wages and conditions of labour in different parts of the country, the marked divergences as regards the character and accessibility of the principal markets and other differences arising from the local environment of the industry are so great that the costing data available for comparison will not be truly homogeneous. Even if we confine our inquiry to industrial units situated in the same centre or area and deriving the same benefits in respect of location, there will still remain significant differences in the character of technical equipment and type of goods manufactured. These differences are so considerable and variable that the question is frequently asked whether in the absence of the uniform conditions prevailing in the industry, does any satisfactory basis exist for the inter-comparison of the costing data? The cumulative effect of these limitations may be so considerable as materially to influence the validity of the main generalisations.

Still another difficulty of a strikingly similar character arises while examining the cost-structure of different units. The question whether for comparative purposes, costs should be expressed as "per unit of output" or as "percentage of the Value of Goods produced" is difficult to answer without examining the nature of the industry and the character of industrial output. In industries like cement or coal, where the output data can be reduced to homogeneity, the costs per unit of output can form a satisfactory basis for measuring and comparing the relative efficiency of different units. But where there exists important qualitative differences in the character of output, such as variation in shape, quality or design, "cost of production per unit of output" will fail to throw any light on the comparative cost-structure of different units. For example, in the cotton-mill industry, a unit operating on yarn of less than twenty counts and producing

cloth of coarse varieties, capable of standardised production, will necessarily have lower cost of production per unit of output than an industrial unit operating on finer counts of yarn and producing goods of light, fine and fanciful varieties. In such cases cost of production per unit of output will vary with the variations in the character of output. Hence the method of expressing costs as " per unit of output " cannot provide a satisfactory basis for cost-comparison unless comparisons are confined to particular counts of yarn or selected varieties of cloth. The only method, therefore, that can be applied for comparing the cost of production of different units is by expressing costs as " percentage of the value of goods produced " or as " percentage of total turnover."

In such cases the cost of component items like raw materials, wages, stores, fuel and power, repairs, etc., would be expressed either as " percentage of the Value of Goods Produced " or as " percentage of Total Turnover." The expression of component costs as percentage of total costs or turnover would furnish some basis for inter-comparison, and render the measurement and inter-comparison of industrial efficiency of different units possible.

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A FURTHER STATISTICAL NOTE ON THE DISTRIBUTION OF INDIVIDUAL OUTPUT

IN an article on " The Distribution of Earnings and of Individual Output " (ECONOMIC JOURNAL, September 1950) an attempt was made to test statistically the hypotheses that certain sample distributions of individuals' output per hour had been obtained from populations in which such output had a normal or a log-normal distribution. Unfortunately the tests used were in many instances inconclusive, and the whole question had to be left open. In this note a brief account is given of an alternative method of procedure which yields more definite results. The results of the application of this method to the data, considered in the article mentioned above, will be discussed.

Suppose that we have a sample of the different outputs, in a given period, of n individuals. Suppose, too, that we consider a

particular normal or log-normal distribution with given mean value and dispersion. What is the probability that the sample was drawn at random from this particular distribution? Since we are dealing with a continuous distribution, such a question is meaningless, as there exist an indefinitely large number of equally likely samples of size n, of which our particular sample is only one. We can, however, consider the "probability density" or "likelihood" in the neighbourhood of the sample, that is to say we can obtain a measure of the probability not of a particular sample but of a whole set of samples that lie in an interval of a certain size containing the particular sample. The measure in question is then the product of the "probability density" and the dimensions of the interval specified. Thus on a given hypothesis as to the parent distribution, every sample is associated with a "likelihood," which is the analogue for a continuous distribution of the probability of obtaining a particular sample in drawing from a discrete distribution.

If there are two hypotheses as to the distribution from which a certain sample was drawn, the likelihoods associated with the sample on the two hypotheses can be compared. The hypothesis for which the likelihood is greater is then the more probable of the two.

The problem with which we are concerned is not, however, to test whether a particular sample of outputs is more likely to have been obtained from a normal distribution of given mean and dispersion or from a log-normal distribution also with given mean and dispersion, but is much more general, namely to test whether a sample is more likely to have come from any normal distribution whatsoever or from any log-normal distribution. The seemingly more general problem can be turned into the simpler one if we agree to give each of the two hypotheses of the general case the best possible chance. Thus we select that particular normal distribution for which the likelihood of the sample is greatest and that particular log-normal distribution for which the likelihood is also greatest. The greatest possible likelihood of the sample on a "normal" hypothesis is then compared with the greatest possible likelihood of the sample on a "log-normal" hypothesis, and as a result of this comparison one or other hypothesis is adjudged more probable.

This procedure was carried out for the samples discussed in the earlier article. A very simple expression was obtained for the ratio of the maximum likelihood of each sample on the normal hypothesis to the maximum likelihood on the log-normal hypo-

thesis, and this expression was then evaluated for each sample.[1] When this ratio is greater than unity, the normal hypothesis is more probable than the log-normal hypothesis; if it is less than unity, the log-normal is more probable. Table I shows the result of these calculations for samples A, B, C, D, E (Male), E (female), F and I, *i.e.*, those samples for which the variation of output per hour (or of log output per hour) with age were not removed.

TABLE I

Letter.	Sample description.	Size of sample.	Maximum likelihood ratio (normal/log-normal).	More probable hypothesis.
A	Chocolate packing	35	0·429	Log-normal
B	Chocolate packing	66	1·084	Normal
C	Cigarette packing	11	0·917	Log-normal
D	Cigarette packing	20	3·565	Normal
E (male)	Spring manufacture	21	1·418	Normal
E (female)	Spring manufacture	24	0·427	Log-normal
F	Bank wiring	73	0·458	Log-normal
I	Record pressing	25	0·718	Log-normal

For the remaining samples the procedure was similar, but some assumption had to be made about the distribution of age in the working population. For reasons of simplicity and because of the extreme difficulty of dealing statistically with any other assumption, this distribution was assumed to be approximately normal at least over the range of ages with which we were concerned.[2]

Table II shows the maximum likelihood ratios for the remaining samples, G, H, J and K, from which variation in output or log output per hour associated with age has been removed.

[1] If the sample consists of n values of output per hour $x_1, x_2, \ldots, x_n$, the ratio of the maximum likelihoods can be shown to equal

$$\left(\frac{\sum_1^n (\log_e x_i - \frac{1}{n}\sum_1^n \log_e x_i)^2}{\sum_1^n (x_i - \frac{1}{n}\sum_1^n x_i)^2} \right)^{\frac{n}{2}} \prod_1^n x_i$$

[2] On this somewhat dubious further assumption, the ratio of the maximum likelihoods equals:

$$\left(\frac{(1-r'^2)}{(1-r^2)} \cdot \frac{\sum_1^n (\log_e x_i - \frac{1}{n}\sum_1^n \log_e x_i)^2}{\sum_1^n (x_i - \frac{1}{n}\sum_1^n x_i)^2} \right)^{\frac{n}{2}} \prod_1^n x_i$$

where r is the correlation between output per hour and age and r' is the correlation between log output per hour and age.

TABLE II

Letter.	Sample description.	Size of sample.	Maximum likelihood ratio (normal/log-normal).	More probable hypothesis.
G	Top stitching	12	2·360	Normal
H	Armature winding	9	1·115	Normal
J	Packing of goods	25	0·335	Log-normal
K	Psychological laboratory test	107	0·030	Log-normal

This, however, is not the end of the matter, for we can compare the probability of the two hypotheses using all the evidence, which we have obtained, simultaneously or indeed any part of the evidence that we fancy. To do this, the maximum likelihood ratios of all the samples, or of any selection of them, are multiplied together. We are then comparing the likelihoods that the samples concerned were all drawn from either normal or log-normal distributions, the mean values and dispersions of which being chosen so as to make the likelihood of each sample as large as possible.

Considering all the samples given in Table I, the maximum likelihood ratio is equal to 0·501, so that on the evidence of that table the odds are 2 to 1 in favour of the hypothesis of log normality. Similarly for Table II the ratio is 0·026, and thus the odds are about 40 to 1 in favour of log normality. If we consider all the industrial samples together but prefer to omit sample K, because of the different conditions under which it was obtained, the ratio becomes 0·442, *i.e.*, odds of 9 to 4 on log normality. Finally, if all the samples are considered, the maximum likelihood ratio is 0·013 and the odds are just under 80 to 1 on log normality.

The test used is thus much more conclusive than those used in the original article, but it is more limited in one respect, namely that it does not allow a hypothesis to be rejected outright but merely expresses its probability relative to that of another hypothesis.

If we are prepared to believe that the hypotheses we have considered are not just two out of a large number of possible hypotheses but are in fact the only possible hypotheses, we can refine the testing procedure still further. It is now proper to consider the possibility that the test will lead us to consider one of the hypotheses to be more probable, when in fact the other hypothesis is true. If we are particularly sensitive about the making of such mistakes, the test must be modified so that we

have option of postponing judgment if the risk of error is unduly great. We therefore require a test such that, if the maximum likelihood ratio is greater than or equal to A, say, we accept the hypothesis of normality while if it is less than or equal to B we accept the hypothesis of log-normality. If the ratio lies between A and B we make no decision, and thus avoid an undue risk of error.

Suppose we wish to be sure that we choose the wrong hypothesis in only $100\alpha\%$ of cases, where α is a number between 0 and 0·5. If the likelihood ratio is greater than or equal to A, say for a particular sample, the chance that this sample came from a normal distribution is at least A times the chance that it was obtained from a log-normal distribution. Thus the chance that all possible samples, for which the ratio is greater than or equal to A, came from a normal distribution is also at least A times the chance that they were all obtained from a log-normal distribution. But the test is to be designed so that it is right at least $100\ (1-\alpha)\%$ of cases and wrong in no more than $100\alpha\%$ of cases; thus, for a given α, A must be not greater than $\frac{1-\alpha}{\alpha}$. By analogous reasoning it may be shown that B is greater than or equal to $\frac{\alpha}{1-\alpha}$.[1]

It can be shown that in practice it is reasonable to take $A = \frac{1-\alpha}{\alpha}, B = \frac{\alpha}{1-\alpha}$, and that these values provide at least the same protection against wrong decisions as would the more precise calculation of the values of A and B.[2]

Using the ratios of the maximum likelihoods, which we have calculated for each sample, we can find approximately the chance that the ratio has decided in favour of the wrong hypothesis. Or, to put it another way, we can find the lowest value of α, which we should have to choose in order to arrive at a decision in each case instead of witholding judgment. The values are given in Table III.

If we consider all the evidence, *i.e.*, samples A to K, the result is reasonably impressive, but is the assumption that the hypotheses of normality and of log-normality are the only possible ones at all tenable? If we agree that the output per hour of an individual

[1] See Abraham Wald, *Sequential Analysis*, p. 41. It is possible that we might be more sensitive about making a mistake in respect of normality than in respect of log-normality or vice versa. This situation can be satisfactorily met, but will not be considered here.

[2] See Abraham Wald, *Sequential Analysis*, pp. 44–8.

TABLE III

Sample(s).	Maximum likelihood ratio (normal/log-normal).	More probable hypothesis.	Chance of being [1] wrong is less than or equal to :
A	0·429	Log-normal	30 times in a 100
B	1·084	Normal	48 ,, ,,
C	0·917	Log-normal	48 ,, ,,
D	3·565	Normal	22 ,, ,,
E (male)	1·418	Normal	41 ,, ,,
E (female)	0·427	Log-normal	30 ,, ,,
F	0·458	Log-normal	31 ,, ,,
G	2·360	Normal	30 ,, ,,
H	1·115	Normal	47 ,, ,,
I	0·718	Log-normal	42 ,, ,,
J	0·335	Log-normal	25 ,, ,,
K	0·030	Log-normal	3 ,, ,,
A–J	0·442	Log-normal	31 ,, ,,
A–K	0·013	Log-normal	1 ,, ,,

[1] Chance of being wrong approximately equals $\frac{1}{1+R}$, when R is greater than 1, or $\frac{R}{1+R}$, when R is less than 1; where R is the ratio of maximum likelihoods.

depends on a large number of random influences and that as a first approximation these influences act independently, then the only question that needs to be decided is how these influences combine. Do they act together additively, multiplicatively or in some other way? Is there indeed any plausible method of combination that is not either multiplicative or additive? At least multiplication and addition appear to be equally simple operations. Is it not then reasonable to assume that they are the only possible alternatives? If this is so, we are at once led to a normal distribution or to a log-normal distribution and, provided that the assumption of random selection of all the samples is justified, we can state conclusively that the evidence is overwhelmingly in favour of the hypothesis of a log-normal distribution and that the chance that we have been misled is only 1 in 100.

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UNREQUITED IMPORTS AND THE TERMS OF TRADE: A NOTE

IN a recent article in this JOURNAL,[1] Professor Pigou has argued that the receipt of unrequited imports by one country from another may generally be expected to turn the terms of trade in its favour. In order to establish this conclusion, Professor Pigou first derives the mathematical condition for the country's terms of trade to improve, and expresses it in terms of the elasticities of each country's desires for its own and the other's product and the proportions of their exports to their total production. He then argues that, on the basis of reasonable assumptions about the magnitudes of the relevant elasticities and fractions, the required condition is likely to be met, so that the terms of trade are likely to turn in favour of the receiving country.

The mathematical argument by which Professor Pigou establishes his final formula [2] is rather confusing: not only are there a number of obvious slips in the presentation, but also the steps in the derivation do not seem to follow logically one from another. For the convenience of readers who might otherwise be obliged to spend a considerable amount of time in attempting to verify the formula for themselves, an independent and, it is hoped, more readily comprehensible derivation of it is presented below. The symbols employed are identical with those in the original article, and their definitions will not be repeated here.

Write p for the price of home goods in B in terms of foreign goods, in the initial situation. This price must be equal to the ratio of the marginal desire for linen to the marginal desire for cloth in both countries. Consequently, in the initial situation

$$\frac{f}{\phi} = p = \frac{\psi}{F}^{3} \quad . \quad . \quad . \quad . \quad . \quad . \quad . \quad (1)$$

In the later situation

$$\frac{f(y-h)}{\phi(A-x-r+k)} = (p+\Delta p) = \frac{\psi(B-y+h)}{F(x+r-k)} \, . \quad (2)$$

Substituting for p and using the first two terms of Taylor expan-

[1] A. C. Pigou, "Unrequited Imports," *Economic Journal*, June 1950, pp. 241–54, especially pp. 247–9.

[2] *Ibid*, p. 248, lines 1–12.

[3] In writing this equation as $\frac{\phi}{f} = p = \frac{\psi}{F}$, and equation (2) analogously, Professor Pigou has evidently forgotten that the Greek letters symbolize the marginal desire of each country for its own goods; since they refer to different commodities, they cannot both appear as numerators in the equations.

sions as approximations to the values of the functions in the later situation,

$$\Delta p = \frac{f - hf'}{\phi - (r-k)\phi'} - \frac{f}{\phi} = \frac{f}{\phi - (r-k)\phi'}\left[(r-k)\frac{\phi'}{\phi} - h\frac{f'}{f}\right] \quad (3)$$

Substituting for $(r-k)$ from Professor Pigou's equation (III) [1]

$$\Delta p = \frac{hf}{[\phi - (r-k)\phi']}\left[\frac{\frac{\phi'}{\phi}\left(\frac{\psi'}{\psi} + \frac{f'}{f}\right)}{\frac{\phi'}{\phi} + \frac{F'}{F}} - \frac{f'}{f}\right]$$

$$= \frac{hf}{[\phi - (r-k)\phi']\left[\frac{\phi'}{\phi} + \frac{F'}{F}\right]}\left[\frac{\phi'\psi'}{\phi\psi} - \frac{f'F'}{fF}\right] \quad . \quad . \quad (4)$$

Since h, $(r-k)$, f, ϕ, F and ψ are positive, and f', ϕ', F' and ψ' are negative, Δp will be positive if

$$\frac{\phi'\psi'}{\phi\psi} < \frac{f'F'}{fF}$$

or, remembering (1), if

$$\frac{\phi'\psi'}{f'F'} < 1 \quad . \quad . \quad . \quad . \quad . \quad . \quad . \quad . \quad (5)$$

The same result follows from development of the other side of equations (1) and (2). This result is identical with Professor Pigou's,[2] and gives the same formula when translated into elasticities, *i.e.*

$$\frac{xy}{(A-x)(B-y)} \cdot \frac{\eta_a}{E_a} \cdot \frac{\eta_b}{E_b} < 1 \quad . \quad . \quad . \quad . \quad (6)$$

In conclusion, it may be useful to remark that the translation of the formula into elasticities, and the subsequent arguments that "no country normally exports more than a fairly small fraction of its aggregate output," and that "in the absence of special knowledge, it is reasonable to suppose that the elasticity of a country's desire for the goods that it makes itself will not differ much from the corresponding elasticity in respect of those that it imports" [3] are an unnecessarily cumbersome (and possibly suspect) way of establishing the conclusion that the terms of trade will tend to move in favour of the country receiving unrequited imports. The conclusion can be established more simply and directly from the inequality (5) above. The inequality will be fulfilled if the marginal desire for home-produced goods diminishes

[1] A. C. Pigou, "Unrequited Imports," *Economic Journal*, June 1950, p. 244.
[2] *Ibid.*, p. 248, line 8. [3] *Ibid.*, p. 248.

less rapidly than the marginal desire for foreign goods in each country; this seems a simpler and more defensible assumption to make than Professor Pigou's.

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Professor Pigou writes as follows: "Forgetful of former *bêtises*, I neglected to get the algebra in my article vetted before publication. The above note refers to the last section of that article. Mr. Carter is an expert mathematician; I have no doubt that the workings in the note are correct and that mine contain slips and errors, for which I apologise. I think I know how this came about, while, nevertheless, the formula which I derived is right. But that is of no interest to anybody except myself."

RISK AND THE COBWEB THEOREM

IN the article, "Risk and the Cobweb Theorem," by F. G. Hooton, in the March 1950 issue of the ECONOMIC JOURNAL, there appears a slight error on page 75.

Fig. 3 on that page is indicated to have both supply and demand curves of the same elasticity. Ignoring the fact that this is an almost indefinable state of affairs unless both curves are considered to have their elasticities constant, the two curves shown most definitely do not have similar elasticities. Rather, they are mirror images of one another, reflected about their point of intersection. The ONLY place at which the elasticities can be considered identical is this point of intersection.

What is identical for both curves is their slopes at any given price or output. For any given price, the outputs differ for the two curves; obviously the elasticities cannot be the same, since the elasticity equals

$$\frac{dQ}{dp} \cdot \frac{p}{Q}.$$

In the original article by Ezekiel [1] the diagram is explained thus: ". . . the demand curve is the exact reverse of the supply curve, so that at their overlap each has the same elasticity."

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[1] "The Cobweb Theorem," M. Ezekiel, *Quarterly Journal of Economics*, February 1938, reprinted in *Readings in Business Cycle Theory*, Blakiston. Above reference to page 429 (*Readings*).

OBITUARY

E. G. Dowdell 1902–1950

The following note is reproduced from the *Oxford Magazine* by the kind permission of the editor:

Dr. Eric G. Dowdell's death at the age of forty-seven removes from St. John's and Oxford a teacher of economics whose mind was singularly acute and incisive. Though blind from infancy and hampered by poor physique, his dogged determination and integrity of character enabled him to make valuable contributions to his generation and until latterly to live a life of remarkable zest. Keenly interested in music, he was himself a competent pianist. He was fond of long country walks and of listening to the calls of wild birds, many of which he could identify by their song. He had a nice sense of words and at times a piquant wit, yet there was the grace of humility about him that sprang from a real Christian piety void of any trace of cant and sentimentality. He never complained of his lot, and took a lively interest in the doings of people. He could talk cricket as well as politics, and enjoyed a good gossip and a game of bridge or chess.

Educated at the Royal Normal College for the Blind, he came up in 1921 as a commoner to St. John's College and took First Classes in Modern History (with the Age of Dante as his special subject) and in Philosophy, Politics and Economics. He was awarded by the University in turn the Junior and Senior George Webb Medley Scholarships in Economics and a Casberd Scholarship by the College. In due time he proceeded to the degree of Doctor of Philosophy with a thesis on the administration of the Middlesex Justices in the century after the Restoration, a work subsequently published with a preface by Sir William Holdsworth. For the past twenty-three years he proved himself a conscientious tutor, particularly appreciated by the abler of his pupils. Though courteous and friendly, he could be a severe critic of slipshod and careless work. If he lacked, as was inevitable, a touch of the picturesque and the colourful, the study of Economics and Economic History provided excellent material for the sharp, analytic quality of his mind.

He took a great interest in many societies for the welfare and education of the blind. He was chairman of the Oxford Society for the Blind, and one of the most active governors of his old school as well as of the Worcester College for the Blind. He was

also a member of the Council of the National Institute and President of the National Federation of the Blind. His life is a remarkable example of the way in which the human soul can rise triumphant over the most serious limitations imposed by nature.

W. C. COSTIN

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Oxford.

READERS of the *Economic Journal* will recall Dr. Dowdell's article on "Concerted Regulation of Price and Output" (June 1948).

He was a familiar figure at gatherings of economists at Oxford. His contributions to the discussion were terse and relevant; often he reminded us of some classical doctrine that bore upon our subject; often, too, he surprised us by his knowledge of recent periodical literature or recent events. He kept abreast. There was a certain detachment in his comments, and a gravity. Occasionally he seemed to be restraining us from running too far afield in pursuit of some modern hare, almost as though *in loco professoris*. But he was very friendly and very modest. He dated from a time, not far distant, when the economists in Oxford were few in number, so that he was very much at home, easy and natural. He had partaken in the struggle to establish economics here; that gave him an assured position of right. I never heard a word of malice or acerbity on his lips; he seemed to be a pure spirit, a student labouring under a handicap of which he did not complain.

R. F. H.

CURRENT TOPICS

MR. M. J. OAKESHOTT, Fellow of Nuffield College, Oxford, has been elected to the Professorship of Political Science at the London School of Economics and Political Science vacant through the death of Professor H. J. Laski.

PROFESSOR G. FINDLAY SHIRRAS has been invited to serve as Professor of Political Economy in Dublin University for one year during the leave of absence of Professor G. A. Duncan, who has been awarded a Leverhulme Research Fellowship and granted leave of absence.

THE newly created International Economic Association was brought formally into existence by a Meeting of the Council held at Monaco during September. The draft Statutes of the Association were considered, amended and approved. The Council discussed the future lines of activity of the Association and gave its approval to the suggestions of the Interim Executive Committee that its main activity should be the holding of small Conferences to discuss clearly and rather narrowly defined problems to which a limited number of experts would be invited. In addition, careful consideration is being given to a project for the translation into English of important economic articles written in the less-accessible languages. Simultaneously with the Council Meeting a series of discussions was held on the subject of the Long-Term Problems of International Balance.

RECENT PERIODICALS AND NEW BOOKS.

Journal of the Royal Statistical Society (Series A.)

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SINGER. *Hacia una nueva acción económica en América Latina :* V. R. ESTEVES. *La economía dinámica de Harrod :* I. M. DE NAVARRETE.

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The African Factory Worker. A sample study of the life and labour of the urban African worker by the Department of Economics, University of Natal. Cape Town and London: Oxford University Press, 1950. 8½″. Pp. 221. 30*s*.

[To be reviewed.]

American Economic Association. Readings in Business Cycle Theory. London: Allen & Unwin, 1950. 8½″. Pp. xvi + 494. 25*s*.

[It is very useful to have available now in an English edition this volume of Readings which was first published in America in 1944 and was noted in this Journal in the issue of April 1945. It contains many articles which it is of great convenience to have readily accessible in this form. Nevertheless, as the Note then published suggested, it has certain serious *lacunæ*, in the sense that important English articles are missing from it. It would be interesting and useful to see it supplemented by a further volume drawn from a wider range of sources.]

Bareau (P.). The Sterling Area: what it is and how it works. 2nd. edition. London: Longmans, Green, 1950. 8½″. Pp. 20. 1*s*. 6*d*.

[This useful short account of the working of the Sterling Area has been revised, enlarged and brought up-to-date.]

Bell (J. D. M.). The Strength of Trade Unionism in Scotland. University of Glasgow: Department of Social and Economic Research, 1950. 9½″. Pp. 48. 5*s*.

[The author seeks to discover the total number of trade unionists in Scotland, their industrial and geographical distribution and to compare the results with those for the United Kingdom as a whole. Measured either by the number of trade unionists per 100 of population or by the number per 100 insured employees the figures do not differ significantly from those of the United Kingdom as a whole. Thus his most interesting results are concerned with the regional and industrial distribution.]

Bloomfield (A. I.). Capital Imports and the American Balance of Payments, 1934–39. A study in abnormal international capital transfers. London: Cambridge University Press, 1950. 9″. Pp. xiii + 340. 45*s*.

[To be reviewed.]

Boh (Lim Tay). The Co-operative Movement in Malaya. London: Cambridge University Press, 1950. 8½″. Pp. 37. 1*s*. 6*d*.

[A popular account of the Malayan Co-operative Movement by a Lecturer in Economics in the University of Malaya.]

British Travel and Holidays Association. Twenty-Second Annual Report for the Year ended March 1950. London: British Travel and Holidays Association, 1950. 8½″. Pp. 39.

[This report throws much light on the United Kingdom's earnings from "Tourism." Of some 550,000 overseas visitors in 1949, just about one-quarter came from the U.S.A. and Canada. Of American visitors, 41% came by air; they spent on average just over £100, excluding fare payments, and nearly £200 including them; nearly half of them arrived in June, July and August; shortage of hotel accommodation is still an important limiting factor; even now only 50% of Americans travelling to Europe come to Britain; the level of the American tourist movement to Europe is still below the 1929 level.]

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COLE (G. D. H.). Essays in Social Theory. London: Macmillan, 1950. 8½″. Pp. 251. 15*s.*

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COOK (R. S.). Costs and Returns from Milk Production in the Southern Province in 1948–49. Reading University: Department of Agricultural Economics, 1950. 10½″. Pp. 26. 2*s.*

[A roneo-ed analysis of the costs of producing milk on sixty farms in the "southern province" of England. Net costs varied from over 28*d.* in two herds to under 16*d.* in the five lowest cost herds, with an average of 21·4*d.*]

CREW (A.). (Enlarged and rewritten by Leo T. Little.) Economics for Commercial Students and Business Men. Thirteenth edition. London: Jordan & Sons, 1950. 7″. Pp. viii + 591. 12*s.* 6*d.*

[To be reviewed.]

DOVER (V.). General Average and the York–Antwerp Rules, 1950, including their application to Marine Insurance. London: Stone & Cox, 1950. 7½″. Pp. 127. 12*s.* 6*d.*

[The principle of general average "springs from a rule of law applicable to all who chance to have interests on board a ship at sea exposed to some common danger threatening the whole. . . . In time of peril, there would undoubtedly have been disputes as to what property should first be disposed of until a time arose when the idea presented itself that it would be reasonable and just that any loss sustained in time of peril for the common safety should be borne equitably by all the parties interested in the common adventure in proportion to their respective shares therein." The applications of the principles have, however, been gradually evolved over a very long period. A revision of the principles was made during 1950, and this small book sets out in simplified form the present principles of average adjustment.]

EUCKEN (W.). The Foundations of Economics. History and theory in the analysis of economic reality. Translated by T. W. Hutchison. London: William Hodge, 1950. 8½″. Pp. 358. 21*s.*

[To be reviewed.]

Gambling, an ethical discussion. A Report of the Social and Industrial Commission of the Church Assembly. London: Church Information Board, 1950. 8½″. Pp. 69. 3*s.*

[This report, which has at present only the authority of the Social and Industrial Commission of the Church Assembly which produced it, finds that "the gambling contract is itself a permissible contract, that is to say, one into which a man may enter without necessarily committing sin." That does not imply that all forms of gambling are permissible or harmless. It is held that no Stock Exchange transaction falls within the definition of gambling adopted in the report. The report finds less objection to betting on the course than to betting off the course. It favours the prohibition or reduction in the scale of football pools and the prohibition of gambling machines.]

GRANT (M.). Roman Anniversary Issues. London: Cambridge University Press, 1950. 8½″. Pp. xxiv + 204. 21*s.*

[The purpose of this study "is to show that a large number of Roman imperial coins and medallions owe their types, wholly or in part, to coincidences in date with important 'anniversary years.' These coincidences are either deliberately arranged or are accidental coincidences of which advantage is taken for purposes of propaganda." Prof. Grant begins by describing the forms of celebration of such anniversaries and then goes on to illustrate his thesis from actual coinages and to identify the issues commemorating various occasions.]

HADFIELD (C.). British Canals. London: Phoenix House, 1950. 8½". Pp. 259. 16*s*.

[To be reviewed.]

HANCOCK (W. K.). Wealth of Colonies. London: Cambridge University Press, 1950. 7½". Pp. 81. 7*s*. 6*d*.

[To be reviewed.]

HEYWORTH (SIR GEOFFREY). Productivity. London: Lever Bros., 1950. 8". Pp. 18. Privately circulated.

[This is a reprint of a speech delivered by Sir Geoffrey Heyworth, the Chairman of Lever Brothers and Unilever to the Annual General Meeting of his company in London. He dealt in considerable detail with the methods by which his company has succeeded in raising productivity and gave numerous illustrations of the savings that were found practicable. He discusses the opportunities under three heads: lay-out and equipment; organisation of work; human relations. It is only if all three are successfully pursued that the best results can be attained. Examples are given in which factories, after the application both of production study and incentives, increased their output by 80% to 150%.]

Industrial Australia. A study of recent expansion. Melbourne and London: Union Bank of Australia, 1950. 8½". Pp. viii + 78.

[A revised and enlarged edition of a useful pamphlet noted in the ECONOMIC JOURNAL of December 1949. It is designed to set out, for the benefit of anyone who may be considering the establishment of a branch in Australia, the necessary background information about Australian resources, conditions and markets.]

JENKINS (R.), ALBU (A.), DIGBY (MARGARET) and WHYTE (ANNE). Post-War Italy. A report on economic conditions by four observers. London: Fabian Publications and Victor Gollancz, 1950. 8½". Pp. 49. 2*s*. 6*d*.

[An extremely interesting report by the four members of a Fabian delegation which visited Italy in the autumn of 1949 at the invitation of the Italian Government. Mr. Roy Jenkins, M.P., writes about *The Italian Economy* in general terms, and gives a fair and unbiased account of the deflationary measures imposed in 1947 to improve confidence in the lira and to strengthen the balance of payments. But after giving full credit to the efficacy of these measures he comes back to the central problem of low production, low investment, high unemployment and low effective demand. He concludes "there is, therefore, little indication at present that Italy is moving towards a solution of her central problem of underinvestment. Until such a solution is achieved, Italy will not be making full use of the breathing space which is provided by Marshall Aid. This assistance is stabilising the political situation and greatly strengthening the technical position of the currency, but it is being allowed to do comparatively little to strengthen the real basis of the Italian economy." In subsequent sections Mr. Austen Albu, M.P., writes about *The Organisation of Industry*, Margaret Digby writes about *Italian Agriculture* and Anne Whyte contributes notes on *The Standard of Living*.]

LINDSAY (P.) and GROVES (R.). The Peasants' Revolt 1381. London: Hutchinson, 1950. 9". Pp. 184. 18*s*.

[To be reviewed.]

MASTERS (D. C.). The Winnipeg General Strike. University of Toronto Press (London: Geoffrey Cumberlege), 1950. 9". Pp. xv + 159. 26*s*.

[An account of the General Strike which took place in Winnipeg in 1919–20. It was largely a test of strength between the One Big Union which had just been established and the Trades and Labor Congress, which was dominated by the Eastern Trade Union. This volume is one of a series dealing with the historical background of the Social Credit movement in Alberta, and it sets the General Strike in a larger perspective of Canadian political and industrial development.]

A Memorandum on the Town and Country Planning Act, 1947. London: Chartered Auctioneers' and Estate Agents' Institute, 1950. 8½″. Pp. 10.

[This carefully argued and responsible pamphlet reaches the conclusion that the provision of the Town and Country Planning Act are so complex and unworkable that Parts V, VI and VII of the Act, which deal with the compensation–betterment problem, should be repealed. In place of these Parts, the Institute would wish to see a system under which no compensation is payable in respect of planning restrictions, but the owner should be entitled, in case of such restriction, to require the local authority to purchase at the market value.]

NATIONAL INSTITUTE OF ECONOMIC AND SOCIAL RESEARCH. Register of Research in the Social Sciences in Progress and in Plan and Directory of Research Institutions. London: Cambridge University Press, 1950. 9½″. Pp. 174. 15*s*.

[This now well-known register of current research in the social sciences is classified under broad heads of subject matter. A subject index facilitates the discovery of research in any field. An index of names enables the work of a particular person to be found. A directory of research institutions completes the available material. The total number of research projects in the whole field covered is now 1265. This excludes, however, the research by private persons as such, and of commercial, political and similar bodies. Nor can the register hope to include much of the university research of senior teachers where this is of a private character; it can print no more than is reported to it. But as a work of general reference it is now well-established.]

NEUMAN (A. M. DE). Consumers' Representation in the Public Sector of Industry. Cambridge: Students' Bookshop, 1950. 8½″. Pp. 22. 3*s*.

[This short pamphlet surveys the different types of machinery for consumers' representation in the nationalised industries. The author records his impression that the councils and committees have as yet done very little constructive work. Most of them complain that consumers make little use of them. His fear is that they are too concerned with educating the consumer to appreciate the producer's difficulties, and too little with their real task of keeping producers alive to the difficulties of consumers.]

NICHOLSON (J. L.). Variations in Working Class Family Expenditure. University of Oxford: Institute of Statistics, 1950. 10″. Pp. 60. 2*s*. 6*d*.

[A reprint of an article published in the *Journal of the Royal Statistical Society*.]

PICKSTOCK (F.). British Railways—the Human Problem. London: Fabian Publications and Victor Gollancz, 1950. 8½″. Pp. 36. 2*s*.

[The author of this report argues that the present Regions of the railway organisation are too large to permit reasonably human relations between the management and the staff. More decentralisation is needed. While top-level consultation is satisfactory, at lower levels it is insufficient and ineffective. A system of promotion, in which merit as well as seniority is taken into account, is urgently needed. There should be more provision for training. In the Unions, education, research and publicity are inadequate. "They have not fully faced up to their responsibilities under nationalisation."]

TEW (B.). Wealth and Income. An analysis of the economic and financial systems of Australia and Great Britain. Melbourne University Press (Cambridge University Press), 1950. 8½″. Pp. ix + 307. 21*s*.

[To be reviewed.]

THOMSON (D. F.). Economic Structure and the Ceremonial Exchange Cycle in Arnhem Land. Melbourne and London: Macmillan, 1949. 8½″. Pp. 106. 12*s*. 6*d*.

[A preliminary account of one aspect of the culture of some tribes of the Northern Territory of Australia by an anthropologist who lived with the people

of Arnhem Land for over four years. The author brings to light the existence of a widely-ramifying ceremonial exchange system remarkably similar to the Kula-cycle of South-East New Guinea first described in detail by Malinowski. The book should be of special interest to economists, exhibiting, as it does, a process of exchange that seems to defy analysis in terms of normal utility theory. Yet, given the ideology of these peoples, the whole system makes sense, and incidentally is by no means non-utilitarian, even though the familiar market-mechanism is lacking, and even though the making of gifts without explicit reference to ultimate requital is the main motivation of the circulation both of ceremonial and utility objects. The author also finds that the comparatively recent influence of Indonesian traders has, if anything, led to a proliferation of the cycle, imports from Malay and elsewhere penetrating farther inland than would have been the case under normal foreign trade motivation. It is to be hoped that Dr. Thomson will follow up this short but valuable study with a more detailed account of the whole culture of the area.]

VINER (J.). The Customs Union Issue. London: Stevens & Sons, 1950. 8½″. Pp. viii + 221. 20*s*.

[To be reviewed.]

WHYTE (L. G.). Principles of Finance and Investment, 2 vols. London: Cambridge University Press, Vol. I, 1949, Vol. II, 1950. 8½″. Pp. x + 192 and vii + 176. 12*s*. 6*d*. each volume.

[To be reviewed.]

WOOTTON (BARBARA). Testament for Social Science. An essay in the application of scientific method to human problems. London: Allen & Unwin, 1950. 8½″. Pp. vii + 197. 15*s*.

[To be reviewed.]

Workers' Control. Sydney: Fabian Society of New South Wales, 1950. 8″. Pp. 24. 1*s*.

[While this pamphlet is primarily concerned with Australian problems it draws heavily on British experience and discusses in terms of the English literature of the subject the place of workers' control in socialist thought, the objectives, the objections and the constructive possibilities.]

American.

ANDERSON (W. A.). Marriages and Families of University Graduates. Ithaca, New York: Cornell University Press (London: Geoffrey Cumberlege), 1950. 9″. Pp. xii + 51. 8*s*.

[This report is based on a study of the marriages and families of Cornell University graduates of 1919, 1920 and 1921. It is reasonable to assume that these classes represent completed families, so far as child-bearing goes. The results are based on a questionnaire returned by 82% of the 81% of the graduates whose addresses were known, and thus covering about two-thirds of the original graduates. It has been possible from the information secured to estimate the ratios of the college graduates marrying to those of the same sex in the general population, to analyse age at marriage, relative ages of spouses, numbers of children, intervals between them, the length of the child-bearing period and a great many other phenomena of interest.]

BALLESTER (J. H.). A Brief Comparison between the Ordinary Life Contracts of Ten Insurance Companies. New York: Graduate School of Business of Columbia University, 1950. 9″. Pp. 29.

[As its title indicates, this pamphlet examines the principal differences between the contracts of ten insurance companies. The differences are analysed under some sixteen heads, and it is explained where and why the differences appear and what they signify.]

BRAUN (K.). The Right to Organize and its Limits. A comparison of politics in the United States and selected European countries. Washington D.C.: Brookings Institution, 1950. 9″. Pp. xiii + 331. $3.00.

[To be reviewed.]

CARPENTER (J. T.). Employers' Association and Collective Bargaining in New York City. Ithaca, New York: Cornell University Press (London: Geoffrey Cumberlege), 1950. 9″. Pp. xiii + 419. 36*s*.

[To be reviewed.]

CLEMENCE (R. V.) and DOODY (F. S.). The Schumpeterian System. Cambridge, Mass.: Addison-Wesley Press, 1950. 8½″. Pp. 117. $2.50.

[To be reviewed.]

DOODY (F. S.), (Ed.). Readings in Labor Economics. Cambridge, Mass.: Addison-Wesley Press, 1950. 9″. Pp. viii + 481. $3·75.

[This volume of Readings produced by a photographic process from the original texts of articles, is designed to supplement American college courses in Labor. For that reason, the articles selected are almost exclusively from American journals and deal with the American applications of the various aspects of labor economics. Within these self-imposed limits of objective, the selection is good and useful. It covers the fields of organisation, incentives, forms of wage-payment, differentials, minimum wages, causes of strikes, collective bargaining, trade union wage policies, wage policy and business cycles, and social security.]

EISTER (A. W.). The United States and the A.B.C. Powers 1889–1906. Dallas, Texas: Southern Methodist University Press, 1950. 9″. Pp. 92. $1.50.

[A study of the effects of the Spanish-American War on the diplomatic and economic relations of the U.S.A. with Argentina, Brazil and Chile.]

HARTLEY (R. W.) in collaboration with WOLKIND (ELEANOR). America's Capital Requirements. Estimates for 1946–1960. New York: Twentieth Century Fund, 1950. 11″. Pp. 244. $3.00.

[To be reviewed.]

HERRING (HARRIET L.). Passing of the Mill Village. Revolution in a Southern Institution. Chapel Hill: North Carolina Press (London: Geoffrey Cumberlege), 1950. 8″. Pp. vii + 137. 24*s*.

[The cotton-mill village, owned by the management, was an institution in the Southern States. It is now passing as mills sell their villages and workers are acquiring their own houses. This passing has all sorts of secondary effects on the character and local government of the villages and on local politics. This monograph shows why managements have been led to sell, and traces the changes in mill-village life due to sales.]

KAPP (K. W.). The Social Costs of Private Enterprise. Cambridge, Mass.: Harvard University Press (London: Geoffrey Cumberlege), 1950. 8″. Pp. xii + 287. 30*s*.

[To be reviewed.]

KIMBALL (M.). Corporate Finance, Principles and Practice. Ames, Iowa: Littlefield, Adams, 1949. 8″. Pp. viii + 305.

[This book provides a summary of methods of finance of firms in the U.S.A. It appears to be written for the student of commerce or business organisation rather than of economics, as the principles discussed are those of elementary accountancy not of economics. It is clearly written, but contains so much condensed matter that it cannot be described as readable.]

KOZMETSKY (G.). Financial Reports of Labor Unions. Harvard University: Graduate School of Business Administration, 1950. 8″. Pp. xi + 280. $3.50.

[This monograph, by an Instructor in the Harvard Business School, throws light on the changing character of Union Reports. While most of them are at pains to set out accurately and scrupulously the receipts and disbursements,

the author finds that the detail does not enable either members or the public to ascertain the cost of union activities or the exact nature of these activities.]

Major Problems of United States Foreign Policy, 1950–1951. Washington D.C.: Brookings Institution, 1950. 9″. Pp. xiii + 416. Cloth $3.00. Paper $1.50.

[To be reviewed.]

MILLER (D. C.). Taxes, the Public Debt, and Transfers of Income. Urbana: University of Illinois Press, 1950. 10″. Pp. xi + 153. Cloth $3.00. Paper $2.00.

[To be reviewed.]

MINTS (L. W.). Monetary Policy for a Competitive Society New York and London: McGraw-Hill, 1950. 9″. Pp. vii + 236. 25*s*. 6*d*.

[To be reviewed.]

MOULTON (H. G.). The Dynamic Economy. A dialogue in pay form. Washington D.C.: Brookings Institution, 1950. 7½″. Pp. vii + 238. $2.00.

[This is a dialogue, in three acts, in which the characters describe and represent the forces which have led to the growth of productivity in the American economy. A Greek Chorus of anonymous farmers disputes with named characters through a series of scenes set in each decade from 1850. The latter include such as Cyrus McCormick, William Ogden, Andrew Carnegie, Graham Bell, Edison, Gompers, Sharman, F. W. Taylor, Henry Ford. The moral is pointed at the end by the teacher who acts, so to speak, as Chorus leader: "we have looked at American life a century ago with its bitterly hard work and its low plane of living, and we have asked with the economists of that day whether there was hope for the future. We have seen how over the century, our private enterprise system *has* succeeded in progressively raising the standards of living of the American people."]

NELSON (B. N.). The Idea of Usury. From Tribal Brotherhood to Universal Brotherhood. Princeton University Press, 1949 (London: Geoffrey Cumberlege, 1950). 8″. Pp. xxi + 258. 20*s*.

[To be reviewed.]

NUSSBAUM (A.). Money in the Law, National and International. A comparative study in the borderline of law and economics. Brooklyn: Foundation Press, 1950. 9½″. Pp. xxxii + 618. $8.00.

[To be reviewed].

Papers of the Michigan Academy of Science, Arts and Letters. Vol. XXXII (1946). Edited by E. S. McCartney and H. van der Schalie (1948. Pp. xiv + 522. 60*s*.) Vol. XXXIII (1947). Edited by E. S. McCartney and F. K. Sparrow (1949. Pp. x + 414. 60*s*.) Vol. XXXIV (1948). Edited by E. S. McCartney and F. K. Sparrow, (1950. Pp. xiii + 350. 55*s*.) Ann Arbor: University of Michigan Press (London: Geoffrey Cumberlege, 1950).

[Each of these three annual volumes contains one paper within the field of economics. In the 1946 volume is a paper by Samuel M. Levin entitled "Thoughts on Industrial Democracy." The 1947 volume includes a paper on "Japan's Foreign Trade—A Proposal," by Harry G. Brainard. That for 1948 prints a paper on "Long-run and Short-run Changes in Productivity and their Effects on Employment," by Daniel B. Suits. Among other papers, most of which are devoted to scientific subjects, are various papers on geography which touch on the field of economics.]

PLANNING PAMPHLETS. No. 71. *The Development of a Policy for Industrial Peace in Atomic Energy.* By D. B. Strauss. Pp. viii + 103. $1.00. No. 72. *A Framework for Long-Range Agricultural Policy.* By O. Heline and D. R. Kaldor. Pp. viii + 68. 50 cents. Washington D.C.: National Planning Association, 1950. 7½″.

[The first of these pamphlets deals with the problems of strikes and labour relations in atomic energy plants. After a strike threat at Oak Ridge, the President appointed a Commission to suggest the best methods of conducting labour relations in the atomic-energy industry. This pamphlet reprints the report and discusses it. The Commission did not recommend special legislation, but preferred more orthodox methods of collective bargaining. A Labor Relations Panel was appointed to take jurisdiction and to use its "full discretion in the use of all voluntary procedures to end the dispute by mutual agreement." The pamphlet records the results of the first operations of the Panel. The second pamphlet considers in general terms the methods of raising the incomes of people now in agriculture. The authors reject those methods which will increase agricultural incomes by transfer from the rest of the Community and do not regard export-dumping as an appropriate technique. Pricing policies should be directed to the efficient use of resources and not to the redistribution of income. Their positive proposals are almost wholly directed to the improvement of agricultural productivity.]

SELLERY (G. C.). The Renaissance, its nature and origins. Madison, Wisconsin: University of Wisconsin Press, 1950. 8″. Pp. 296. $3.75.

[A text, at the sixth form or first-year undergraduate level, which deals in lively fashion with all aspects of the renaissance. Six pages deal in rather summary fashion with the economic aspects, stressing particularly the influence of the Church on economic thought and practice.]

SELZNICK (P.). TVA and the Grass Roots. A study in the sociology of formal organization. Berkeley and Los Angeles: University of California Press (Cambridge University Press), 1950. 9″. Pp. ix + 274. 28*s*.

[To be reviewed.]

SONNE (H. C.). "Economics" as applied to Government Fiscal Policy and Debt Management. New York: Sanders Printing Corporation, 1950. 7½″. Pp. 29.

[The author, Mr. Christian Sonne, Chairman of the Board of Trustees of the National Planning Association, argues that it must be recognised "that there are certain periods of bad times when a deficit is not only permissible but helpful." If, however, deficit financing were to result in reckless spending, an annual balanced budget may be the lesser evil. If money is to be kept sound and tax rates are to be reasonable, debt must not increase too rapidly. That implies surpluses in good years. What is wanted is the right balance between practice and theory.]

TALBOT (P.), (Ed.). South Asia in the World Today. University of Chicago Press (Cambridge University Press), 1950. 9″. Pp. x + 254. 30*s*.

[To be reviewed.]

THOMPSON (V. A.). The Regulatory Process in OPA Rationing. New York: King's Crown Press, Columbia University (London: Geoffrey Cumberlege), 1950. 9″. Pp. xi + 466. 37*s*. 6*d*.

[To be reviewed.]

Indian.

Annual Market Review 1949. Bombay: Premchand Roychand, 1950. 9½″. Pp. 87.

[An account of market trends in all the different sectors of the Indian economy. It includes discussions of events in the money and foreign-exchange market,

in raw materials, manufactured textiles and the precious metals, and has a series of useful statistical tables covering all these fields.]

DEY (H. L.). Policy of Protection in India. A retrospect. Poona: Gokhale Institute of Politics and Economics, 1950. 9½". Pp. 25. 1*s*. 6*d*.

[A most interesting lecture on the actual procedures and workings of the Indian Tariff Board, first during the pre-war period, and later after its functions had been re-defined in 1945 and again in 1948.]

KARVE (D. G.). Public Administration in Democracy. Poona: Gokhale Institute of Politics and Economics, 1950. 9½". Pp. 61. 3*s*.

[A very vigorous and lively discussion of modern administration as it works out in a democracy under the conditions of to-day. Prof. Karve has read widely and draws freely on recent British experience and writings. His essay deserves to be read not only in India but in all democratic countries.]

MEHTA (J. K.) and AGARWALA (S. N.). Public Finance, theory and practice. Allahabad: Kitab Mahal, 1949. 8½". Pp. xiii + 704 + ix.

[To be reviewed.]

PODUVAL (R. N.). Recent Trends in India's Foreign Trade. Delhi: Premier Publishing Company, 1950. 7". Pp. 83.

[Two lectures delivered at Madras University during February 1950. The first deals with the changing pattern and distribution of India's foreign trade. The second deals with the commodity balance of trade and the need to stimulate exports.]

French.

ALLAIS (M.). Abondance ou Misère. Paris: Librairie de Medicis, 1946. Pp. 132.

[M. Allais' theoretical work has received considerable attention abroad in recent years. Readers will welcome his views on current planning problems, but it is a pity that they should only become available to them four years after the events which they seek to interpret. M. Allais' general thesis is that the post-war problems in France overshadowed by inflation are soluble only if the stultifying effects of physical controls are got rid of. The alternative to controls and a debilitating inflation is the establishing of a competitive economy tempered by redistribution of wealth. To quote the words of the author, " the exigencies of life do not admit of a perfect solution, but an approach to a solution is afforded by the application of the competitive principle accompanied by an appropriate policy of redistribution, and this is infinitely preferable to the central planning solution. The advantages of the latter exist only in the imaginations of its protagonists and is to be condemned as much in practice as in theory " (p. 88). Although it has been pointed out that M. Jacques Rueff's *Épitre aux Dirigistes* resembles Meade's *Planning and the Price Mechanism*, *Abondance ou Misère* bears an even stronger resemblance. For the foreign reader the pungent style and clarity of expression should give much enjoyment.]

Institut National de la Statistique et des Études Économiques. L'Asie Soviétique. Paris: Presses Universitaires de France, 1949. 9½". Pp. 232. 500 *frs*.

[The purpose of this study is to afford the reader material for the appraisal of the economic exploitation of Soviet Asia, particularly in recent years. The authors distinguish four areas, North Siberia, the Urals, East Siberia and Central Asia and consider their geographical features, supplies of natural resources and transport facilities in detail. Although, as would be expected, the study is hampered by lack of sufficient statistical information for the framing of historical comparisons, the authors appear to have combed all available sources and have presented a most interesting picture of Soviet economic expansion and of the

economic relations between the Soviet and its Eastern neighbours. Some useful maps are included in a folder at the back of the volume.]

LAUFENBURGER (H.). Économie Financière en Trois Leçons. Paris: Recueil Sirey, 1950. 9″. Pp. 140.

[In these essays, Prof. Laufenburger maintains that it is necessary to shift the emphasis in the teaching of public finance away from the study of tax problems, which were considered in detail by the Italian School, towards the study of the effects of the growth of the positive intervention of the State in the economy via budgetary and monetary policy. This is quite in keeping with current thought in the Anglo-Saxon world, but the author attempts the impossible in trying to set out "en pleine lumière" the full implications of developed budgetary and financial techniques in three easy lessons. The second essay describes the extent of the growth of the public sector in a number of countries by reference to such factors as the growth in the number of Civil Servants, the growth in public income and expenditure, etc., and, on the whole, is precise and accurate, particularly in the sections on the redistribution of income. The third chapter, which considers monetary policy, is not so successful. The points made concerning the limitations of monetary policy in influencing the level of activity are familiar enough. It is somewhat disturbing to find that the only references to Keynes and Harrod in the discussion of inflation are to the "General Theory" and "Trade Cycle," both of whom have so skilfully analysed inflation in macro-economic terms in more recent times. In consequence, the author's discussion of savings and investment is best ignored. It is not essential to the author's argument, and it will only annoy the monetary theorist.]

MARCHAL (J.). Cours d'Économie Politique. Paris: Librairie de Medicis, 1950. Pp. 938.

[This massive volume provides a first-year course in economics in which special emphasis is laid upon the prescriptive nature of our study. The first part, some 300 pages, is a potted economic history interspersed with comments on contemporary "Dogmengeschichte" of a rather pedestrian nature. One chapter stands out from the rest. There is an unusually clear account of modern scientific method in economics in which reference is made to the use of analysis (including elementary difference equations). The distinction between theoretical, historical and "previsional" models is a neat one. It is a pity that this chapter is not used as the morphological foundation of this work. The book passes on to a straightforward account of price theory incorporating a useful synthesis of modern theories of imperfect competition and closing with a long-winded digression on the meaning of value in economics. In the Money and Banking section, it takes the writer a long time to make contact with the really interesting problems. When eventually problems of monetary expansion and contraction are dealt with, no general theory is advanced and the first-year student is left to take his pick of a bewildering number of individual theories. Two general criticisms might be advanced. No clear-cut account is given of the framework of the economic system—a necessary pre-requisite for the study of monetary theory. Lastly, the text is too elementary to provide the student with the necessary background for the impressive bibliography provided for him. For example, the discussion of monetary theory eventually reaches the Fisher equation, but from there the student is referred to Robertson's "Essays in Monetary Theory" and Myrdal's "Monetary Equilibrium," to name only the better known.]

WEILLER (J.). Problèmes d'Économie Internationale. Paris: Presses Universitaires de France, 1950. 9½″. Pp. 333. 800 *frs.*

[To be reviewed.]

Belgian.

JACQUEMYNS (G.). *La Société Belge sous l'Occupation Allemande* 1940–1944. Alimentation et état de santé. Pp. 538. Mode de vie. Comportement moral et social. Pp. 502. Les travailleurs deportés et leur famille. Pp. 143. Brussels: Nicholson & Watson, 1950. 9½″.

[To be reviewed.]

German.

ARNIM (W. VON). Strukturwandlungen und Nachkriegsprobleme der Wirtschaft Danemarks. Kiel: Institut für Weltwirtschaft, 1950. 8″. Pp. 65. DM 3.50.

[To be reviewed.]

BINDER (R.). Die Belastung durch die persönliche Einkommensteuer in Deutschland, England und den Vereinigten Staaten. Kiel: Institut für Weltwitschaft, 1950. 8″. Pp. vii + 196. DM 15.

[The result of detailed statistical comparisons is to show that the general level of income taxation in Germany is about four times as much as in the U.S. and 50% above that in Great Britain. This result is obtained by comparing income levels at the official exchange rates. The complexities of international comparisons of tax burdens emerge clearly from this attempt.]

CARELL (E.). Unternehmergewinn und Arbeitslohn. Munich: Richard Pflaum, 1950. 9½″. Pp. 174. DM 18.

[To be reviewed.]

GECK (L. H. A.). Sozialpolitische Aufgaben. Tübingen: Mohr, 1950. 9″. Pp. 62. DM 2.40.

[This booklet contains the text of two lectures given by the author at Bonn University. The first deals with the social importance of economic education, the second with that of personnel policy. The papers are preceded by a more general discussion of the tasks of social policy. The author is a well-known authority in his field, and displays wide historical and factual knowledge in discussing his subject.]

HEECKT (H.). Strukturwandlungen und Nachkriegsprobleme der Wirtschaft Norwegens. Kiel: Instituts für Weltwirtschaft, 1950. 8″. Pp. 48. DM 2.50.

[The study first describes the economic structure of Norway and then proceeds to a discussion of present economic policies and planning objectives. The "social accounts" for Norway are briefly but adequately described. A final chapter describes the special locational advantages and disadvantages of the country within a more integrated Western European system.]

HERLEMANN (H. H.). Die Versorgung der westdeutschen Landwirtschaft mit Mineraldünger. Kiel: Institut für Weltwirtschaft, 1950. 8″. Pp. 74. DM 4.

[This study represents the results of a report on the supply of fertilisers to agriculture in Western Germany, made to the Minister of Food at the request of the Bi-Zonal Economic Council. The report deals successively with requirements, production and sales conditions. It stresses the unsatisfied requirements (estimated at 70% above present consumption) and argues against a reduction of productive facilities under the dismantling programme. The need for farmers' education is also stressed.]

HORNSCHU (H. E.). Die Entwicklung des Finanzausgleichs im Deutschen Reich und in Preussen von 1919 bis 1944. Kiel: Institut für Weltwirtschaft, 1950. 8″. Pp. xiv + 198. DM 12.

[To be reviewed.]

PLATE (R.). Der Weltgetreidemarkt nach dem zweiten Weltkrieg. Berlin: Paul Parey, 1950. 8″. Pp. 233.

[A statistical study of the position and outlook for production, trade and prices of the main grain products. After a detailed consideration of bullish and bearish price influences, the author concludes that the bearish influences will predominate and prices will gradually come down, more or less as envisaged by the International Wheat Agreement. No bad or sudden break in prices is expected.]

STELLING (ILSE). Die Sozialisierung des Kohlebergbaus in Grossbritannien. Kiel: Institut für Weltwirtschaft, 1950. 8″. Pp. vi + 71.

[This is a straightforward, purely descriptive account of the movement towards nationalisation of coal mining in Great Britain, from the days before the First World War to the present time. This being a topical subject at the present time in Germany, the book with its facts will no doubt be useful to German readers. To British readers it offers little, since there is no attempt at economic analysis or judgment. Such issues as proper pricing or investment policies for nationalised industries are avoided.]

STISSER (R.). Standort und Planung der deutschen Kraftfahrzeugindustrie. Bremen-Horn: Walter Dorn, 1950. 8″. Pp. 84. DM 4.

[This study of the localisation problems of motor-vehicle production in Western Germany arrives at the conclusion that the main demand for new investment in this industry will be in the production of tractors and motor cycles; that for both types of production the best form of organisation is a big plant in a large town; but that the production of components and accessories can be suitably decentralised. The inquiry proceeds from locational theory, as applied to the industry, to locational policy; and in this latter respect the author is inclined to favour the expansion of the industry in its present centres of production.]

WEBER (A.). Dogma und Wirklichkeitssinn in der Sowjetwirtschaft. Munich: Verlag der Bayerischen Akademie der Wissenschaften, 1950. 9″. Pp. 52. DM 3.50.

[To be reviewed.]

WEBER (A.). Weltwirtschaft. Berlin: Duncker & Humblot, 1950. 9″. Pp. xiii + 464. DM 15.

[To be reviewed.]

Die Weltwirtschaft mitte 1950. Kiel: Institut für Weltwirtschaft, 1950. 11½″. Pp. 91. DM 5.

[To be reviewed.]

Austrian.

WEBER (W.). Wirtschaftswissenschaft und Wirtschaftspolitik in Österreich. Vienna: Springer, 1949. 9½″. Pp. 85. 11*s.* 6*d.*

[This book represents a catalogue and classification of economists, public finance experts, statisticians and business economists who have taught in Austria. The story starts with early cameralism in the seventeenth century during the reign of Emperor Leopold I, and is thus by no means confined to the "Austrian School." The schools distinguished are the cameralists, classics (two pages only !), romantics, historians, normative school, the "Austrian School," and the modern "organics." The second part describes the influence of economic doctrines on economic policy, the activities of economists in policy and of politicians in economic science. The book is also addressed to students of economics, but is too much in the nature of a catalogue of names and titles to take the place of a real *Dogmengeschichte*.]

Swiss.

BACHMANN (H.). Westeuropäische Wirtschaftsunion oder wirtschaftliche Zusammenarbeit? Zurich and St. Gallen: Polygraphischer Verlag, 1950. 8″. Pp. viii + 48.

[To be reviewed.

Dutch.

EKKER (M. H.). Equilibrium of International Trade and International Monetary Compensations. The Hague: Central Planning Bureau, 1950. 9½". Pp. 41.

[A reprint of an article that appeared in *Weltwirtschaftliches Archiv*, 1950, *Heft* 2. It represents an attempt to dissect a system of trade movements so as to show the equilibrium movement of the system. For this purpose the author distinguishes the bilateral equilibrium component, the circular equilibrium component, the flowing component and the net positions component.]

Export Promotion and the Drive for Dollars. The Netherlands benefit by Marshall Aid. Rotterdam: Rotterdamsche Bank, 1950. 10½". Pp. 45.

[An account, in English, of the measures that the Netherlands have adopted to stimulate dollar exports. In 1947 Dutch exports were equivalent to only 44% of the imports; by the last quarter of 1949 they had reached 84%. To promote dollar exports 10% of the net export proceeds are at the free disposal of exporters. Various organisations, together with special trade Commissioners, have been created. Facilities are being developed for holding stocks in the United States. None the less, a final section emphasises the immense advantages which the Netherlands have derived from the existence of Marshall Aid.]

Italian.

COSCIANI (C.). Elementi di economia politica. Third, revised edition. Padua: Cedam, 1950. 9". Pp. 370. 900 *l.*

[The third edition of a fairly elementary text-book; it is not stated when it was first published, nor to what extent it has been brought up to date.]

COSCIANI (C.). La riforma tributaria. Analisi critica del sistema tributario italiano. Florence: "La Nuova Italia," 1950. 7½". Pp. 374. 1300 *l.*

[A critical description and analysis of the Italian system of taxation, which is offered as a preliminary to a general reform.]

INSOLERA (F.). Teorica dell'ammortamento. Turin: Einaudi, 1950. 9½". Pp. 303. 2400 *l.*

[A mathematical treatise on the amortisation of capital. It contains a general discussion of the problems from the actuarial and financial points of view. Together with the *Theory of Capitalisation*, announced in this JOURNAL, March 1950, it completes the author's *Treatise of Actuarial Science*.]

STARK (W.). La storia dell'economica in relazione allo suiluppo sociale. Milan: L'Industria, 1950. 9½". Pp. 82. 500 *l.*

[An Italian translation of the author's *History of Economics in its Relation to Social Development*, published in 1944 and reviewed in the December 1945 issue of the ECONOMIC JOURNAL.]

VINCI (F.). Istituzioni di Economica. Bologna: Cesare Zuffi, 1950. 10". Pp. 370.

[To be reviewed.]

Danish.

BREMS (H.). Advertising, the Desire to Purchase and Purchasing Power. Copenhagen: Einar Harcks Forlag, 1950. Pp. 148.

[A theoretical analysis, in Danish, of advertising and the equilibrium of a single firm and an oligopolistic industry and a discussion of the effects of advertising on the level of employment.]

Spanish.

SARDA (J.). Una Introducción a la Economía. Barcelona: Bosch, 1950. 9″. Pp. 238. 60 *ptas.*

[This book is designed to make some of the more recent contributions to economic thought available to Spanish readers. It starts from the national resources of labour and capital and proceeds from them to the national income and the balance of payments. It goes on to trace the relations of public finance and budgetary policy to national income. Subsequent sections deal with the organisation of production, with consumer demand, competition, monopoly and imperfection competition. Next the rewards and supplies of factors are analysed. Finally, we come to the determination of the level of activity and income, monetary supplies and policies, the effects of liquidity preferences, and the problems of fluctuations and their avoidance. The author is Professor of Economics and Public Finances in the University of Barcelona.]

Egyptian.

CHALOM (G.). La Détermination Fiscale des Bénéfices Commerciaux et Industriels en Égypte et les Recours Contentieux. Cairo: S.O.P. Press, 1949. 10″. Pp. 165. P.T. 40.

[This work combines a detailed examination of the legal framework of the profits taxes imposed in Egypt since shortly before the Second World War with a discussion of the comparative effects of this type of taxation in both Egypt and France.]

Czechoslovakian.

ERBAN (E.). Budget of Peace and Social Progress. Prague: Orbis, 1950. 8″. Pp. 62.

[An account, in English, of the work of the Czech Ministry of Labour and Social Welfare.]

Work for all or Unemployment. Prague: Orbis, 1950. 8″. Pp. 126.

[This book seeks to contrast the ever-present spectre of unemployment in the Capitalist countries—suitably documented from some of the more critical articles of *The Economist* and *The New Statesman and Nation*—with "the liquidation of unemployment by peaceful methods," to be found in the U.S.S.R. and its satellites.]

Official.

BRITISH.

BRITISH TRANSPORT COMMISSION. Report and Accounts for 1949. London: H.M. Stationery Office, 1950. 9½″. Pp. viii + 408. 8*s.*

[This report, which covers the Calendar year 1949, describes the progress made in carrying out the various objectives of the Transport Act of 1947. Since capital investment had to be limited by general economic considerations, the progress could not be rapid, and has largely taken the form of acquisition of undertakings and preparations for their co-ordination and integration. There is a brief discussion of the charges scheme now under consideration and a fuller discussion of the financial problems of the Commission. The greater part of the report is given up to the activities of the various Executives, and to financial and operating statistics.]

COLONY OF TRINIDAD AND TOBAGO. Quarterly Economic Report, April–June 1950. Trinidad: Central Statistical Office, 1950. 11″. Pp. 32 and tables. 12 *cents.*

[This is the first of a new enlarged series of quarterly reports on the economic position of Trinidad and Tobago, which is planned on a generous and very in-

formative scale. The introductory comments on the trend of the economy suggest that, while during the last quarter activity was higher and the balance of payments favourable, this was largely the consequence of a rise in the value of exports. There is some danger that import prices will tend to follow the rising trend of export prices, so that an adverse change in the terms of trade is likely and would produce serious difficulty. The most disturbing feature is the failure of crude oil production to expand. Unless new oil reserves can be found, the economy will have to depend increasingly on the sale of other products.]

Industrial Development in the British Territories of the Caribbean. Report prepared by the British member of the Industrial Survey Panel appointed by the Caribbean Commission. 3 vols. London: Colonial Office, 1950. 13″. Pp. 194, 264 and 198.

[To be reviewed.]

Union of South Africa. Fourth Annual Report of the Registrar of Banks for the Period ended 31st December 1949. Pretoria: Registrar of Banks and Building Societies, 1950. 13″. Pp. 36. 2*s*. 6*d*.

[This further Annual Report contains full statistical information about the assets and liabilities of the commercial and other banks of the Union of South Africa.]

American.

Catalog of United States Census Publications 1790–1945. Prepared by H. J. Dubester. Washington D.C.: U.S. Department of Commerce, Bureau of the Census, 1950. 9″. Pp. 320.

[A hand-list of some 3600 publications issued from the Bureau of the Census between 1790 and 1945. It possesses a useful subject index which, together with the subdivision of the list into sections, makes it easy to find a list of publications dealing with any particular subject.]

Eighth Report to Congress of the Economic Co-operation Administration, for the quarter ended March 31, 1950. Washington D.C.: U.S. Government Printing Office, 1950. 9″. Pp. x + 137. 40 *cents*.

[This report, covering the first quarter of 1950, is a useful supplement to the larger E.C.E. reports produced in Geneva and the various reports which emanate from O.E.E.C. in Paris. It contains, apart from valuable comment, a large number of statistical tables covering not only the recovery of European production and the development of European exports, but also the uses of counterpart funds, the forms which aid has taken, the types of technical assistance and numerous other relevant facts about which information is not elsewhere readily accessible.]

The Midyear Economic Report of the President, transmitted to the Congress July 26, 1950. Washington D.C.: United States Government Printing Office, 1950. 9″. Pp. 160.

[This report emphasises the recovery from the recession of 1949. The rate of production of goods and services in the first half of 1950 was about 5% above the rate of mid-1949. Business investment had shown the largest increase among expenditures, being $10·6 billion or about 33% greater in the first half of 1950 than in the second half of 1949. This was mainly a switch from inventory liquidation to inventory accumulation. At the same time residential construction had risen by about 25%. Once again a foreign observer cannot but be impressed and surprised at the almost exclusively inward-looking character of this survey. There are no more than half a dozen pages about the economic effects of the United States relations with the outside world. It is, however, increasingly apparent that the closing of the dollar gap is coming much more from a decline of exports than an increase of imports. The post-devaluation dollar value of imports in the first half of 1950 was about 3% greater than in the first half of 1949, while the value of exports was about 25% less.]

INDIAN.

GOVERNMENT OF INDIA. MINISTRY OF COMMERCE. National Income of British India and the Union Provinces, 1945–46. 1949. Pp. 16. National Income of the Indian Union Provinces, 1946–47. 1950. Pp. 17. New Delhi: Government of India Press. 9½".

[These estimates of the Indian national income for 1945–46 and 1946–47 are based on the concept of "net national income produced within India at factor cost." The presentation is laconic and no indication is given of the probable margins of error of particular items. The authors give up in despair, however, an attempt to include the former Indian States. The estimates would indicate an average income per head of Rs. 198 for British India and Rs. 204 for the Union Provinces, as they stood after partition, in 1945–46; the real income in 1946–47 was about the same, but a rise of some 12·5% in prices meant an income of about Rs. 228 per head for the Union Provinces in current prices.]

GOSWAMI (M. N.). A Survey of Rural Economic Conditions in Darrang. Shillong: Assam Government Press, 1950. 10½". Pp. 58.

[A sample survey in a District of Assam.]

A Note on Balanced Cultivation. New Delhi: All-India Congress Committee, 1950. 9½". Pp. 58. Re. 1/-.

[This report starts with various alternative assumptions regarding the caloric requirements per head of population and estimates the deficiencies of various foods and raw materials. It is estimated that, compared with the ideal levels of consumption set out, the overall deficit in food supplies will be of the order of 54% by 1951.]

Our Immediate Programme. New Delhi: All-India Congress Committee, 1950. 8½". Pp. 99. Rs. 2.

[The report of a Planning Conference held in New Delhi during April 1950. It includes speeches by a number of Ministers. But the most important contents are the Resolutions of the Conference and the Immediate Economic Programme that was generally approved. The programme is in qualitative and desiderative terms, rather than in terms of an attempt to measure statistically the available resources and the competing claims upon them. The main emphasis is on growing more food and producing more of the essential raw materials and consumers' goods by means that will give productive employment to the unemployed and under-employed. But this must be reinforced by increased investment made possible "by mopping up surplus purchasing power in sectors least habituated to capital formation through a scheme of voluntary but nation-wide austerity," as well as by the removal of "restrictive unplanned and outmoded controls" and their replacement by others more appropriate to present needs.]

DUTCH.

LISMAN (J. H. C.). Econometrics, Statistics and Thermodynamics. The Hague: Netherlands Postal and Telecommunications Services, 1949. 9½". Pp. 104.

[Dr. Lisman attempts to explain certain frequency distributions, in which the Dutch Post Office is interested: they include various kinds of financial transactions with the Postal Cheque and Transfer System and with the Post Office Savings Bank and of the number of telephone calls both of different length and made by different subscribers. He has sought another science, where actual frequency distributions have been satisfactorily explained by theory, and has chosen thermodynamics rather than the more suitable biological sciences. The introductory chapter discusses at length the role of analogy in scientific argument and follows this up with a similar treatment of entropy. Unfortunately, on p. 15, Dr. Lisman betrays that he has no very clear idea of what economists mean by a demand curve. There follows the most interesting section of the pamphlet in which various empirical frequency distributions are discussed and portrayed on logarithmic probability paper. The assertions about the precise nature of each distribution might be more readily believed if χ^2 had occasionally been used to

test the goodness of fit of any assumed distribution. Next he attempts to draw an analogy between the kinetic theory of gases, and financial transactions. The analogy is not a plausible one, and appears to be little more than a somewhat uncritical effort to use results in physics to explain economic phenomena. Finally, there is an unilluminating discussion of the analogy between H. T. Davis's theory of Budgets (*The Theory of Econometrics*, pp. 170 *et seq.*) and thermodynamics. Having decided to identify entropy with utility, Dr. Lisman makes the astonishing discovery that in maximising utility *homo oeconomicus* obeys the second law of thermodynamics! This sort of nonsense can do nothing to help those anxious to escape from the determinism of current mathematical economics to formulations where chance and frequency distributions play their proper part. Some time no doubt the Theory of Stochastic Processes, now being developed elsewhere, will be of use in economics; and now that Dr. Lisman's faith in analogy seems to have been shaken by his excursions into fantasy, perhaps his future work will be directed to hastening the arrival of that day.]

INTERNATIONAL.

Freedom of Association and Conditions of Work in Venezuela. Geneva: International Labour Office (London: Staples Press), 1950. 9½″. Pp. 185. 6*s*.

[The report of a Mission sent to Venezuela, at the request of its Government, by the International Labour Office.]

International Monetary Fund. Annual Report, April 30, 1950. Washington D.C.: International Monetary Fund, 1950. 9″. Pp. xi + 160.

[To be reviewed.]

ORGANISATION FOR EUROPEAN ECONOMIC CO-OPERATION. Report on Internal Financial Stability. Paris: O.E.E.C., 1950. 10″. Pp. 140.

[This survey deals, first in general terms and then in relation to each of the eighteen countries, with the inflationary and deflationary factors at work in Europe down to March 1950. In many respects increasing output and the elimination of bottlenecks have made the problems easier. On the other hand, the period under review covered the devaluations of 1949, substantial diminution of American aid and a continued high level of investment. In a majority of countries inflationary pressures, before the outbreak of war in Korea, had been brought fairly effectively under control. In Belgium, Germany and Italy prices were falling and unemployment was high, partly for structural reasons, but partly also for lack of effective demand. The Working Party that produced the report stresses the growing importance of maintaining internal stability if trade between the European countries is to be progressively liberated without repercussions. Deflation in one country, it is emphasised, may create difficulties for others by diminution in their exports. At the same time, consumption levels must take account of the progressive reduction of American aid.]

Tin 1949–1950. A review of the world tin industry. The Hague: International Tin Study Group, 1950. 10″. Pp. 55. 4*s*.

[This annual survey of the world tin position is based on statistical material collected by the International Tin Study Group. The year 1949–50 showed great changes. Free markets were re-introduced and government control almost disappeared. A sharp fall in consumption towards the end of 1949 and the steady increase of production led (temporarily as we now know) to a break of prices and the consideration of an intergovernmental commodity agreement.]

UNITED NATIONS. Annual Report of the Secretary-General on the Work of the Organization, 1 July 1949–30 June 1950. Lake Success: United Nations (London: H.M. Stationery Office), 1950. 11″. Pp. xiv + 43. 11*s*.

[One chapter of this report is devoted to economic and social questions. The economic section of the chapter deals, *inter alia*, with such questions as the plans for producing world economic surveys, the studies of economic stability and full

employment, the development of under-developed areas, commodity problems and the activities of the regional Economic Commissions. The social problems include human rights, the status of women, planning of social development, population and migration, social welfare and narcotic drugs.]

UNITED NATIONS. Economic Survey of Asia and the Far East, 1949. Lake Success: United Nations (London: H.M. Stationery Office), 1950. 9″. Pp. xix + 485. 22*s*. 6*d*.

[To be reviewed.]

UNITED NATIONS. Implementation of Full Employment Policies. Report No. 1, Second Half of 1949. Lake Success: United Nations (London: H.M. Stationery Office), 1950. 9″. Pp. 52. 3*s*.

[This report begins by analysing the replies of twenty-one countries to the questions addressed to them by the Secretary-General. These included questions about measures to stimulate consumption, to encourage private investment, to increase public investment, to increase government expenditures, to increase net exports. The countries fall into five main groups: the first, which includes the United Kingdom, had virtually no unemployment; the second had significant, but relatively low, unemployment; the third, which in the second half of 1949 included the United States and Belgium, had unemployment which seemed to be of serious proportions; the fourth and fifth groups were undeveloped and non-self-governing territories. Some of the replies of certain countries are printed *in extenso*, including those of the United Kingdom and those made on behalf of our dependent territories.]

Proceedings of the United Nations Scientific Conference on the Conservation and Utilization of Resources. Vol. I. Plenary Meetings. United Nations: Dept. of Economic Affairs (London: H.M. Stationery Office), 1950. 11″. Pp. lxi + 431. 32*s*. 6*d*.

[The record of a Conference held at Lake Success during August and September 1949, at which some 700 scientists met to discuss and consider over 500 papers. The complete record will fill a total of eight volumes. This first volume includes a verbatim record of the plenary meetings and the papers discussed at them. The subjects were very varied. They included studies of the world resources in relation to population (Colin Clark contributing a paper), critical shortages (with a paper on food shortages by Sir Herbert Broadley), the interdependence of resources, soils and forests, fuels and energy, metals and minerals, resources creatable by applied technology, resource appraisal, techniques for less-developed countries, river-basin development and finally a symposium on future lines of study.]

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